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EFFECTIVE SYSTEM OF BACTERICIDAL CONDITIONING FOR HOSPITALS

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Control of the hospital environment is an important initial step in the campaign to control hospital infections. Daily treatment of the patient's entire environment with chemicals is not feasible, but bactericidal treatment of the air can and must be continuous. Four materials are here described for use as waxes, in floor preparations, and on air filters; for application as wax to metal and glass; for spraying walls, ceilings, floors, and mattresses; and for laundry, furniture, and draperies. Their effectiveness was studied in a comparative experiment in which alternate wards in a hospital were studied bacteriologically, the air being recirculated at various set rates. It was found possible to bring about a steady reduction of the bacteria in the air without depending on a central air conditioning system. A major portion of the bacteriological killing depends on procedures other than air filtration. The methods suggested were found consistent with ordinary hospital housekeeping techniques.

AN INCREASE in mortality and morbidity from infections in hospitals is attributed to dissemination of bacteria which are resistant to antibiotic drugs. Most prominent among the resistant strains of bacteria is the coagulase-positive Staphylococcus aureus (80/81 strain). The serious nature and wide currency of the staphylococcic infection problem has been emphasized at large conferences held specifically for discussion of this topic. The problem is now of sufficient magnitude to demand the establishment of infection committees in all institutions within which sick persons are housed.

The committee on infections in the Francis Delafield Hospital made a decision to undertake control of the hospital environment as an initial step in its campaign to control hospital infections. For this purpose it has been necessary, first, to define precisely the elements comprising the hospital environment; second, to find the proper agents to be used in the control of the environment; third, to conduct controlled experiments utilizing the agents and methods selected; and, fourth, to evaluate objectively the altered environment.

Hospital Environment

The hospital environment is defined in a personal rather than a geographical way. The person in relation to whom this definition is made is the patient. His environment is made up of a multiplicity of contributions from all of the persons, things, and mediums with which he has contact.

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The air in which the patient moves and which he breathes is a principal element of the environment. The persons and things which both the patient and the hospital air touch contribute to the total constitution of the environment.

The relative importance of any portion of the environment depends on the intimacy, frequency, and duration of contact which the patient may have with that particular unit. The air and linen supply for patients probably exceeds in relative importance the bacterial flora on a ceiling. On the other hand, even bacteria on a ceiling assume importance when and if they enter the ocean of air to which both the patient and his linens are exposed. Food as well as its preparation was deliberately omitted from this experiment.

Formulations Used in Removal of Bacterial Contamination in Hospital

	%
Formulation A (for waxes, floor preparations, and air filters)	
Silver nitrate	1.32
Ammonium thiocyanate	1.32
Triton X45	5.04
Hyeryl A-1000	26.01
Poloco 380	33.61
Nuodex 100	0.35
Propylene glycol	0.32
Water	32.03
Formulation B (for metal and glass wax)	
Dialkyl*dimethyl ammonium chloride	0.0214
o-Hydroxybenzoic acid	0.0140
Bis(n-tributyl) tin oxide	0.0151
2,3,5-Triphenyl-2,1,3,4-tetrazolium chloride	0.0015
2-Amino-2-hydroxymethyl-1,3-propanediol	0.0168
2-Hydroxyethyl tetramethyl ammonium chloride carbamate of zinc chloride	0.0105
Dimethylcarbinol	0.0216
Neutroleum gamma	0.0008
Inert ingredients	99.8882
Formulation C (spray for walls, ceilings, floors, mattresses, and laundry)	
Dialkyl*dimethyl ammonium chloride	0.0214
Salicylic acid	0.0140
Bis(n-tributyl) tin oxide	0.0151
Inert ingredients	99.9495
Formulation D (spray for laundry, furniture, and draperies)	
Salicylic acid	0.0301
Arquad 2C-75	0.2064
Neutroleum gamma	0.0273
Bis(n-tributyl) tin oxide	0.0325
Isopropanol 99%	0.0957
Spice bouquet	0.0082
Inert ingredients	99.5998

* Alkyl groups as in the fatty acids of cocoanut oil.

The bacterial populations in the respiratory system and on the skin of patients, hospital staff, and visitors are considered to be an uncontrollable portion of any patient's environment. They are also unpredictable. Therefore, removal of bacterial contamination, not simply detection of human carriers per se, is one of the prime objectives in the design of an environmental control system. This concept is important in our program for bactericidal conditioning of hospitals. The hospital has been changed from a repository for germs into a self-decontaminating area. These alterations in environment have been achieved by the addition of bactericidal substances and by removal of bacteria.

Agents and Methods

The difficulty in selecting bacterial substances was one of finding drugs of lasting germ-killing properties. Daily treatment of the patient's entire environment with chemicals is not feasible. It is also acknowledged that the bactericidal treatment of air must be continuous.

The low-cost, long-lasting bactericidal properties, ease of applicability, wide-range spectrum response, and low toxicity of the agents finally selected were decisive factors. A list of these formulations is contained in the table. Bactericidal conditioning was designed for both efficacy and duplicability in other hospitals.

At the laundry, hospital linens were treated by addition of bactericide to the rinse water for sheets, towels, blankets, pajamas, curtains, and staff uniforms. The concentration selected was such that substantivity would be maintained only until the next washing cycle. A more permanent effect (for example, for the life of blankets) can be obtained by using materials impregnated with the bactericide at manufacturing levels. However, in order to achieve the variable control essential for this experiment, the laundry technique was used.

Ceilings and walls of each ward, ward corridor, utility room, lavatory, and solarium in the patient areas were washed and then sprayed with a bactericide. Waxes for glass, furniture, and metal were prepared with added bactericide. Every article within patient contact was either washed or sprayed with one of the bactericidal formulations. Mattresses and pillows were sprayed and then covered with bactericidal plastic covers. All covered areas such as radiator shields and ducts were opened, cleaned, and sprayed. The floor wax contained bactericide preparations. Routine floor care followed, with bactericide added to the mop water.

The hospital air was controlled as follows: Patient areas were under positive pressure, and areas of known, continual infection were subjected to negative pressure with external exhaust. Exhaust fans were also placed at one end of the ward corridors. Fresh air intake window fans were placed in each ward. Air recirculation was maintained in the wards, corridors, and solariums by means of small recirculation units for bactericidal filtration. Window input and recirculation units contained double filters impregnated with bactericide. The total volume of air was recirculated once every 10 minutes (that is, recirculation time equals 10 minutes, or RT=10). This recirculation time (RT) was varied as the experiment progressed. Filters were changed on a cosmetic rather than germicidal basis, since the former preceded the latter need by some weeks. After the initial stage of preparing test areas, bactericide was used only in mop water, water used to wipe off furniture, and aerosol spray bombs for spot disinfection purposes.

Hospital Experiment

The Francis Delafield Hospital is a 300-bed general cancer hospital staffed by Columbia University and administered by the city of New York. Its general plan is indicated in figure 1. The hospital contains no central air conditioning plan or equipment.

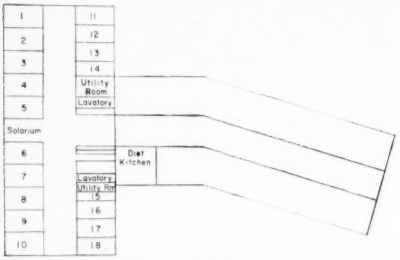

Fig. 1.—General plan of Francis Delafield Hospital. Second, third, fourth, and fifth floors have 40 six-bed wards, 10 to each floor (areas 1 to 10 in diagram), which constituted the test and control areas studied. Areas 11 to 18 are two-bed or three-bed rooms.

General Bacteriological Evaluation of Hospital Environment.—For three days, consecutive culturing was done in all patient and service areas, by streak, poured plate, and open dish methods, which included fomites as well as air. Culture tubes and plates were marked by number. Colonies were counted and identified by the hospital bacteriological staff, who did not know the origin of the cultures. Results were entered by code in log books, the key to which was held by one member of the committee on infections. A number of potential sources of infection were discovered, but no changes were made in the hospital routine throughout the course of all the experiments.

Air samples were collected on opened, preincubated Petri dishes containing sterile nutrient agar. Exposure time was one hour. Cultures were made during times of day when average patient and visitor activity was in progress. Cultures were incubated at 37 C for 20 hours. Bacterial colonies were counted with the Quebec dark-field counter and a four-power lens.

Colonies resembling Staph. aureus were reincubated at room temperature for two days and reexamined for pigment production. For all cultures the bacteria were identified by colony characteristics and by microscopic examination of Gram-stain smears from individual colonies.

Staphylococcus colonies were replated on sheep blood agar medium, and the presence of hemolysis after incubation was recorded. Coagulase tests were also performed on these strains. The penicillin impregnated disk method with 18-hour culturing on agar plates was used to determine antibiotic sensitivity or resistance. (Detailed studies on organisms other than staphylococci will be published elsewhere.)

Preliminary Control Experiment.—The statistical consultants for the hospital experiment requested that it be conducted on the basis of alternating wards as controls and as bactericidally conditioned areas on each of the four inpatient floors (fig. 2). After this recommendation, alternate wards were treated by the methods previously described. For control wards, only routine hospital procedures were used, except that the same type of window input and air recirculation fans were installed to keep air procedures similar. Air control for this experiment consisted of filtration of the locally recirculated room air once every 10 minutes (RT=10).

In order to use the alternate ward system, it is necessary to maintain closed doors between the bactericidally conditioned wards and the alternating control wards. Both ambulatory patients and hospital staff personnel have easy access to these doors in our hospital. Closure of the doors for many weeks would be required for evaluation of altered population of bacteria in the air of the conditioned areas.

The committee on infections was unable to secure the level of cooperation needed for full evaluation of this checkerboard technique. Nevertheless, alternate ward conditioning did result in an average 50% decrease of colony counts in air of conditioned wards. Experience with this alternate ward experiment has reemphasized the need for bactericidal conditioning, agents, and methods which are consistent with routine hospital housekeeping measures and which require little or no change in habits or therapeutic techniques.

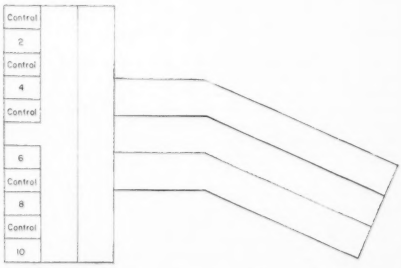

Fig. 2.—Preliminary control experiment. Only six-bed wards numbered 2, 4, 6, 8, and 10 (and odd-numbered similar wards on alternate floors) were bactericidally conditioned. Doors permit not only control ward air but also contaminated corridor air to enter each conditioned ward whenever door is opened.

Long-term Forty-Ward Hospital Experiment.—After the preliminary experiment, two patient floors were completely exposed to bactericidal conditioning. Wards, solariums, utility rooms, lavatories, and diet kitchens were washed and sprayed, and air control measures were instituted in these areas as well as in ward corridors.

As the experiment proceeded, changes were made in the air control measures. Principally this consisted in working out better exhaust techniques to control negative pressure areas with more efficiency and less noise, while recirculation times within the patient wards were raised and lowered to find the exact point of bactericidal control in the presence of the most extreme conditions of contamination. Simultaneously, this afforded an opportunity to ascribe relative importance to air control measures and the other means of bactericidal conditioning.

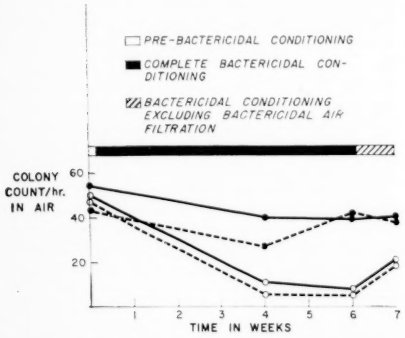

Fig. 3.—Effect of bactericidal action on hospital environment. Each point on graph is average value of 60 air cultures. Duplicate cultures in all 10 of six-bed wards on all four floors were made for three consecutive days; thus, 60-culture average of each floor has been made. Lines with black circles represent control floors; with open circles, test floors.

After complete conditioning of the two floors, they were designated as test floors; the remaining two patient floors were used as controls. It was recognized that the previous checkerboard treatment applied to the control floors would tend to lower their total bacterial counts and apparently lower the system's efficacy. This was accepted as a condition of the experimental control.

Air cultures were made on each floor daily, with two cultures to each ward room. Culturing was done in corridors, solariums, isolation rooms, and nurses' stations. At intervals, surface and fomite cultures were also taken.

All Petri dishes were identically placed during the experiment, one near and to the right of the corridor door, the other to the left and near the far window. Exposure time was one hour at varying intervals ranging from maximum visitor exposure to late night quiet. Culturing for final evaluations was done during evening visiting hours.

Results

Long-term Forty-Ward Experiment.—The effect of long-lasting bactericidal action on the hospital environment as interpreted through air cultures is shown in figure 3. The initial values (in colony counts) on the control floors were 54 and 43; those on the test floors, 47 and 50. Four weeks later, the control floors had values of 27 and 40; the two bactericidally conditioned floors yielded air counts of 5 and 11 respectively. One and one-half months after bactericidal conditioning, the control floors were found to have counts of 39 and 43, while the test floor counts were 5 and 8, a reduction of 87 and 82% respectively.

It next seemed desirable to ascertain the relative value of the main components of the system used to accomplish this result. The last point on each of the four graphs in figure 3 represents the average cultures one week after the bactericidal agents were deleted from the air filtration process. The remaining decrease in bacterial colony counts on the test floors (to 18 and 20 respectively) below the control values (38 and 40 respectively) is attributable to components of the bactericidal conditioning process other than those directly applied to air.

Approximately two-thirds of the bactericidal effectiveness in this experiment may be attributed to elements of bactericidal conditioning not related to bactericidal filtration of air. Under conditions of extreme contamination of air, the relative value of bactericidal filtration increases somewhat.

Laboratory Model for Comparing Effectiveness of Bactericidal Conditioning Systems.—Early in our studies of hospital environmental problems related to pathogenic bacteria, the need for a model designed to approximate physical conditions encountered in a hospital building was apparent. It is useful in rapid screening for bactericidal efficacy of a large number of substances. Models also permit study of various methods of use for the selected bactericidal agents.

Our hospital model is similar to a bacteriological transfer chamber. It has six sides, is hermetically sealed, and contains 27 cu. ft. of space. This chamber is equipped with walls which are easily sterilized and which can be coated with various types of bactericides. It is furnished with an air recirculation machine which can optionally be equipped with different types of filtration devices.

The experiments in the model system have included the 80/81 strain of coagulase-positive, penicillin-resistant Staph. aureus. The details of four such experiments with this micro-organism are as

follows: The principal point of reference quantifying the efficacy of agents and techniques is the rate of disappearance, over a period of two hours, of known numbers of specific micro-organisms grown in pure culture. The recirculation rate for all the experiments described here is one volume of air every four minutes (RT=4).

For experiments A, B, C, and D, two billion staphylococcus organisms were nebulized into the model hospital chamber in a single injection at the time recorded "0" for not more than two minutes' time. Experiment A consisted of simple recircula-

Petri dishes used for air cultures in experiments A, B, C, and D were exposed for periods of five minutes each to cover, in duplicate, the entire period of two hours during which experiments in this model were run. The model chamber is equipped with built-in gloves long enough to permit remote, sterile handling of culture dishes throughout the experiments. The cultures could in this way be opened for specific five-minute intervals throughout the total time of the experiment so that cultures were done for consecutive five-minute periods.

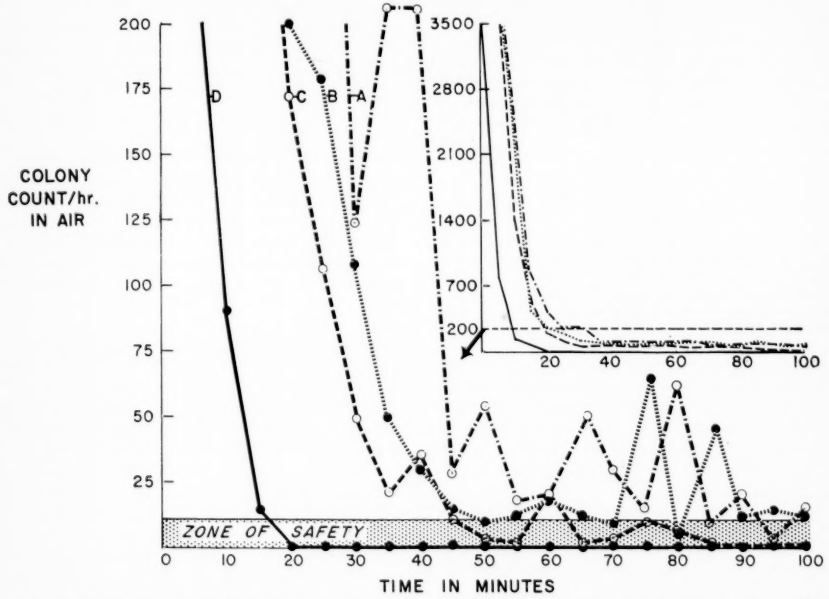

Fig. 4.—Colony counts in control and three experimental situations established in model chamber. Graph *A* is control; *B* represents serial counts when ordinary commercial filter is used; *C* shows effect of bactericidal filter without any other part of system; and *D* is model of hospital system found most effective—a combination of bactericidal filtration of air and bactericidal treatment of all surfaces.

tion without bactericidal coating of the walls and without bactericidal filtration of the air of any sort (control experiment). Experiment B consisted of filtration of the recirculated air through a synthetic fiber filter not containing bactericide; walls of the chamber were not coated with bactericide. Experiment C consisted of bactericidal filtration of the recirculated air; walls of chamber were not treated with bactericide. Experiment D consisted of bactericidal filtration of recirculated air; walls of chamber were coated with bactericide (see table).

The results of experiments A, B, C, and D are shown graphically in figure 4. For our model, as was the case with the hospital building, an upper limit of 10 colony counts for relative bacteriological safety was adopted. For the model system, the five-minute exposure periods are equated in the time-space scale to equal one hour. Therefore, the time required for reduction of the viable recirculated Staph. aureus suspended in air in these four experiments is the main criterion on which comparison of the different bactericidal techniques is based.

In experiment A (control), viable Staph. aureus organisms were erratically collected at dangerous levels of concentration throughout the entire experiment.

Similarly, in experiment B, viable organisms were collected, in somewhat lesser numbers, at dangerous levels throughout the course of the experiment despite use of an ordinary air filter.

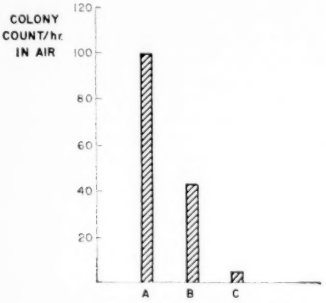

Fig. 5.—Colony counts. A, changing of ordinary, laundered blanket in ordinary hospital room yields level of 100 colony counts per hour. B, level of 43 results when bactericide-treated blanket is changed. C, only 5 colonies per hour are deposited when both room and blanket are bactericidally conditioned.

The bactericidally conditioned air filter used in experiment C produced a bacteriologically "safe" atmosphere in 45 minutes' time. At 65 minutes, a secondary rise to a level of 20 counts resulted. After 65 minutes, there is no return to levels above 10 counts. The zero mark was first reached in the 80-85 minute sample.

Experiment D was a model of the system finally adopted for our hospital bactericidal conditioning program. After the 15-minute sample, all of the culture plates failed to grow Staph. aureus.

This striking result gives objective support to the decision which resulted in the selection of agents applied in the fashion represented in experiment D for use in the actual hospital situation.

Corollary Hospital Experiments.—Our studies of the effectiveness of the bactericidal conditioning system included determination of the contributions from both persons and things to the population of pathogenic bacteria in the hospital air.

Hospital Blankets: A three-stage experiment on hospital blankets was performed. During the culturing period of one hour, no activity in the room was permitted. At the midway point in time, the blanket was stripped from the bed, turned over, and tucked around the mattress with the head and foot reversed. The blankets in each experiment were taken from the hospital linen supply immediately on return from the laundry. Activity was again forbidden for the remainder of the culturing period.

As shown in figure 5, when this procedure was followed in a two-bed ward room with a laundered blanket without bactericidal conditioning of the air, blanket, or room surfaces, a culture colony count of 100 was obtained. When this experiment was repeated in a room having no bactericidal treatment of either fomite surfaces or air, with a blanket bactericidally treated in the laundry, the colony count was 43. The third stage involved a bactericidally conditioned blanket and a room which had been given the same conditioning of air and surfaces as carried out in the hospital during the main experiment. The colony count then was 5.

Patients with Staphylococcic Infections: Figure 6 illustrates an experiment in two two-bed wards. Before bactericidal conditioning the air in each of these wards averaged 42 colony counts. After bactericidal conditioning they remained near zero for three weeks. Two patients, one with a mouth lesion and one with furunculosis of the shoulder (both of bacteriologically proved Staph. aureus origin), were admitted to room A. The recirculation factor was RT=10. After two days of high counts in room A, the patients were shifted to room B. Within six hours, room A, despite a high degree of personnel activity, was decontaminated to zero. In two days the air colony count in room B rose to 113.

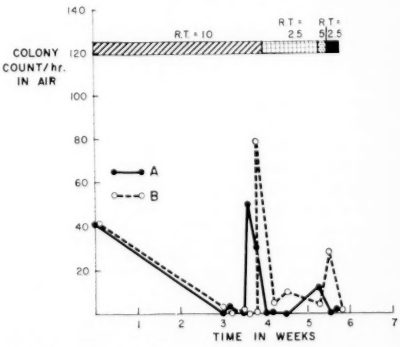

Fig. 6.—Effect on colony counts when patients with staphylococcic infections moved from room A to room B near end of fourth week. Note rapid fall-off of counts in room B when recirculation time (RT) decreased from 10 to 2.5 minutes.

At this point recirculation time was changed to RT=2.5. The air colony count dropped to 5 within six hours.

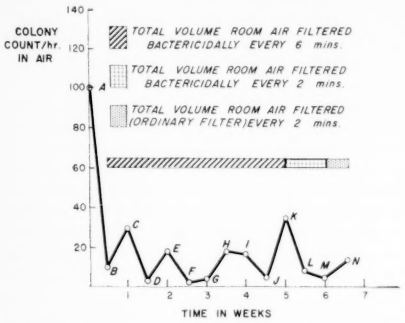
COLONY COUNT/hr. IN AIR
TOTAL VOLUME ROOM AIR FILTERED BACTERICIDALLY EVERY 6 mins.
TOTAL VOLUME ROOM AIR FILTERED BACTERICIDALLY EVERY 2 mins.
TOTAL VOLUME ROOM AIR FILTERED (ORDINARY FILTER) EVERY 2 mins.
TIME IN WEEKS

Fig. 7.—Continuous study of cultures. *A*, prebactericidal conditioning; *B*, bactericidal conditioning (checkerboard); *C*, door open to contaminated corridor; *D*, all wards bactericidally conditioned; *E*, door open to contaminated corridor; *F*, corridors bactericidally conditioned; *G*, door open to bactericidally conditioned corridor; *H*, four resident physicians examining patients; *I*, enema administered; *J*, normal ward activity; *K*, tracheostomy patient admitted to ward; *L*, normal ward activity; *M*, normal ward activity; and *N*, reversal experiment (bactericidal air filtration discontinued).

During the fifth week of this experiment, single bactericidal filters were substituted for double filters. The rise in air colony counts for both rooms prompted a return to use of double bactericidal air filtration. Colony counts immediately decreased again. In the middle of the sixth week, the recirculation time in room B was changed to RT=5. The count immediately rose to 28. The next day it was changed back to RT=2.5, and the count dropped to 2. Room A in the meantime remained at zero, except for the period when single filtration was attempted.

Continuous Gross Air Contamination: Study of the cultures taken during the course of many experiments indicates that the highest level of contamination contributed by patients is from male tracheostomy patients. Gross contamination from such patients has been demonstrated at a distance of 14 ft. from the patient. As shown in figure 7, the air recirculation utilized was RT=6 up to point K, when a male tracheostomy patient was admitted to the ward. The colony count then rose to 35. The RT factor was changed to 2, with a decrease in the count to 7 and then 4, in one week's time (points L and M). The rise at point N was due to the cessation of bactericidal air filtration during the "reversal" phase of the experiment.

During a three-week period a study was made of a six-bed ward to which patients were admitted with colostomies (2), an infected neoplasm of the lung, a rectovaginal fistula, a urinary tract infection, and a salpingo-oophorectomy. The problem of odor as well as air contamination was considered to be important. Details of this study are seen in figure 8.

Comment

The air control system finally adopted is shown in figure 9. It will be noted that the corridors are bactericidally conditioned and are included in the air control plan. Throughout our experiments of the last several months, it has been shown repeatedly that it is necessary to have an air lock adjacent to the patient areas in which the lowest possible contamination is sought. This measure prevents chance contamination of the air in the wards when doors are opened.

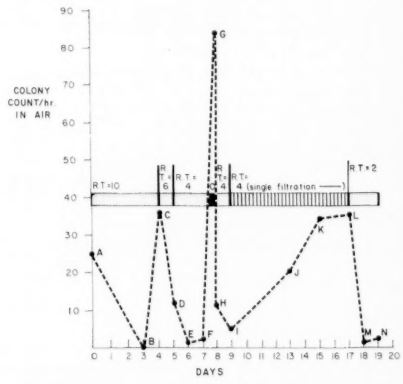

Fig. 8.—Study of odor problem. *A*, only patients with salpingo-oophorectomy and urinary tract infection in ward; *B*, bactericidal conditioning of ward; *C*, two colostomy patients and one lung cancer patient admitted to ward; *D* and *E*, recirculation of air changed to 6 and 4 minutes respectively; *F*, no change in conditions; *G*, bactericidal air filtration completely discontinued; *H*, 3 hours of reinstitution of air recirculation at RT=4; *I*, continuing low level of 5 counts; *J*, patient with rectovaginal fistula admitted; *K*, continuing rise in air colony counts during period of single-filter bactericidal filtration of air; *L*, high point before institution of double filtration of air with bactericidal filters and recirculation every 2 minutes; and *M* and *N*, levels maintained by double filtration at RT=2 even though no contaminating elements from patients have been altered.

It is readily acknowledged that great emphasis has been placed on the role which hospital air plays in making the environment either safe or danger-

ous. As Blowers and associates [1] have demonstrated, there is a direct correlation between surgical infection rates and air contamination. In addition, they have shown that the Staph. aureus carrier rate among both hospital patients and staff members decreases with a decrease in the degree of air contamination.

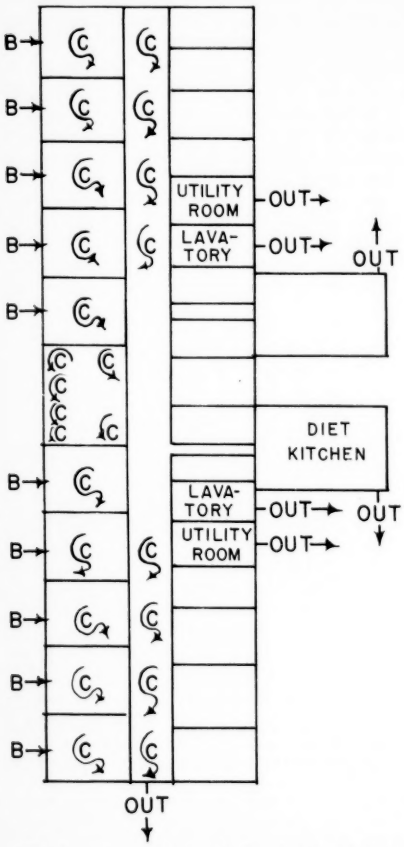

Fig. 9.—Air control system finally adopted. *B* indicates air intake window unit containing double bactericidal filter. *C* indicates interior recirculating fans with double bactericidal filters. All points labeled "out" are external exhaust fans.

On the other hand, the importance of inanimate objects in harboring bacteria has been elucidated by Walters.[2] His statement that "blankets are reservoirs and spreaders of bacteria in many hospitals" has prompted the blanket experiment included in the body of this report.

Our purpose has been to develop a system which utilizes commercially available substances and requires equipment useful in existing hospital buildings which are not centrally air-conditioned. The agents which we have used have been low in cost and have been used successfully. "Success" has been defined in terms of decontamination of the hospital environment as it is defined here in such a way that the basic conditioning process will probably not have to be repeated more than four times annually. That the hospital air must be continuously treated is an obvious fact. However, the removal of excessive contamination by means of variable control of the air recirculation rates through double bactericidal filters provides a flexibility in the sytem which it would otherwise lack.

The effect on the hospital environment through the use of the bactericidal formulations selected for the Francis Delafield Hospital experiments has been obtained because of the long-lasting bactericidal properties of the formulations used.

Summary

The current problem of hospital-acquired bacterial infections is believed to be a function of contamination in the patient's environment. Long-lasting bactericidal agents have been tested and found practicable and safe in hospital use. Hospital and laboratory experiments with these agents have been successfully conducted. More than four-fifths of the bacteria in air can be removed by the use of a combined air-and-fomite system of bactericidal conditioning. The agents and techniques for bactericidal conditioning are commercially available and reasonable in cost. Bactericidal control in hospitals is not dependent on a central air conditioning system. Bactericidal filtration of air without inclusion of other measures is not sufficient for an optimal result. Bactericidal conditioning is consistent with ordinary hospital housekeeping techniques.

99 Fort Washington Ave. (32) (Dr. Hudson).

All of the bactericidal agents used in the hospital and laboratory experiments were formulated and supplied by the Permachem Corporation, New York.

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CONTROL OF INFECTIONS WITHIN HOSPITALS

SPECIAL REFERENCE TO PREVENTION WITHIN OPERATING ROOMS

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A searching study of hospital infections showed that blankets, shoes, the bottoms of trousers, straw brooms, dry mops, and certain types of vacuum cleaners were important spreaders of infection. It was found that the surgical area could be cleaned up and would remain clean until contamination was introduced. Personnel could learn so to conduct themselves with respect to masks, clothing, and shoes that they would not introduce contamination. An interchange zone was developed to separate the surgical area from uncontrolled areas, and a sexless, sizeless, reversible gown and improved footwear were adopted to facilitate changing when personnel are obliged to pass from one area to another. A fitted filter autoclavable mask was devised to prevent contamination of clean room air by respiratory exhalations of personnel or patients. If deep-seated wound infections with resultant systemic manifestations are to be prevented, the ultimate in asepsis must be attained, and no leniency can be tolerated.

Three years ago a study was launched into causes for infections occurring within Huggins Hospital and methods for prevention. This work has continued actively to date. Two years ago it was realized that nearly any patient who had entered the hospital clean during the preceding year and who had contracted an infection while there was the victim of an error in technique.[1] These errors include prophylactic use of antibiotics and steroid hormones used nonspecifically, but infection incidence in this hospital is influenced by these two factors only as they may have been induced by self, druggist, or practitioner administration to patients before they were hospitalized.

The most fundamental fact regarding the broad problem of infections occurring within hospitals is that clean or healthy tissues become infected because they are exposed to infectious agents at a level of virulence, concentration, or frequency of exposure beyond their resistive powers. Here in this fact, experience indicates, lies a practical approach to control measures. If reduced to axiomatic form, the fact would read: Where there is no contamination of healthy tissues, there is no infection. Restated in procedural terms, it would read: When necessary standards of sanitation and care are practiced in the protection of tissues from contact with infectious organisms, almost no infection will occur. The problem is one of cleanliness—how to attain it, and how to maintain it.

This article is a report of investigations made into the causes of infections in Huggins Hospital and a description of a control program which has now been proved to be medically effective, practical, and economically feasible. The studies were made primarily because of seven wound infections that occurred in the course of 356 operative procedures after establishment of protective measures previously but erroneously thought to be adequate.

Attainment of Cleanliness

Daily tests were done over a period of six months to determine the effectiveness of mechanical and antiseptic cleanliness in reducing bacterial contamination of rooms. One series of tests was done in adjacent rooms subjected to steady and parallel usage. Cultures were taken in multiple areas of each room, with the location known only to the bacteriologist, and these were made without any preliminary preparation. Sieve sampler techniques were used for air sampling; swab and flush washing techniques were used on furniture, walls, and floors. Room 1 was then given daily the most thorough mechanical cleansing that a good workman could apply, including ceiling, walls, floors, and every item in the room. He used a detergent selected by himself at a local store. Each succeeding day for a week he bought and used a different one. His work was supervised and directed by a nurse with long experience, a known eye for dirt, and a perfectionist attitude of abhorrence for a speck of dust. In room 2, the type of cleaning supplied by the housekeeping department was continued. It should be added that the hospital has held a good public reputation locally for being a clean and neatly kept institution.

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Immediately after each room was cleaned, cultures again were taken from the same areas. Usage of both rooms continued actively throughout the day and night. Eight and 24 hours after cleaning, cultures were taken from the same areas. The rooms were similarly cleaned and tested on the second day, and the program was continued each day for seven days.

For a second week, two wards which were subject to similar usage were selected, and this experiment was repeated without variation, except for one detail. The cleaning solution used was an excellent detergent-disinfectant (Tergisyl), a concentrated solution of sodium xylene sulfonate, triethanolamine dodecyl benzene sulfonate, *o*-phenylphenol, and *p*-tertiary amylphenol. It was supplied as a 2% solution and without limitation as to amount available, both to the highly competent, especially supervised workman and to the routine workers of the housekeeping department. In subsequent one-week periods, these parallel tests of cleaning procedure and effectiveness were run on two corridors, two dressing rooms, two kitchen and dining areas, two utility rooms, two linen preparation rooms, and two operating rooms. Both test areas had the same detergent-disinfectant solution used, not only by the extremely good but also by the ordinary cleaning personnel. In fact, after the third week the detergent-disinfectant solution was adopted as the only one for every cleaning procedure in the entire hospital, not only because it was a good preparation but also in order that there might be no prejudiced factor unwittingly introduced by variation in cleaning solutions.

Analysis of these accumulated data brought out several facts convincingly. Thorough mechanical cleaning has a demonstrable, dramatic, and almost immediate effect in the reduction of bacterial contamination. This reduction progresses with daily repetition of the process. There is a slight to moderate residual effect from the cleansing over a succeeding period of several hours. Casual, superficial, and unintelligently supervised cleaning has scarcely any demonstrable beneficial effect in reducing the amount or type of bacterial flora. When an efficient detergent-disinfectant compound is added to a good mechanical cleaning process, there is an obvious residual effect that can be demonstrated bacteriologically on cultures taken as long as eight hours after previous cleaning. From these many weeks of comparative studies, there emerged an important facet of truth: By a procedure of frequently repeated, intelligently directed, and vigorously applied mechanical effort in combination with a good detergent-disinfectant, any surface or area whatever can be rendered clean or even sterile.

There were additional observations. The wards were the dirtiest. The private rooms were the cleanest. Blankets are a constant source of contamination and will spread micro-organisms from one patient to another promptly if blankets are moved from one bed to another or if patients are put into beds that are not provided with freshly sterilized, clean blankets.[2] So also will contamination be transferred by a blanket to an operating room if it is allowed to go with the patient from his bed to that room. One can render washed bankets uniformly sterile by addition of a 2% concentration of *o*-phenylphenol and *p*-tertiary amylphenol (Amphyl) to the final rinse of the laundry washing cycle. Ordinary mops and cloth rags are little more than culture mediums for bacteria unless they are frequently and thoroughly cleansed in a detergent and disinfecting solution. Straw brooms and dry mops and dusters, like ordinary vacuum cleaners, are essentially dispersing agents for bacteria, and the use of all of these items should be prohibited in hospitals.

Although hot water plus a good detergent-disinfectant makes an excellent cleaning solution, it has been shown to become infected with viable organisms unless the solution is changed frequently enough to avoid development of a dirty appearance. Laundry hampers, as used in standard practice, are filthy, but they can be readily sterilized before being used to receive clean laundry. The best routine is the requirement that they be turned upside down and washed out with a detergent-disinfectant solution, but laundry workers will not cooperate with this regulation except when forced to it. Additionally, the hampers should be lined with paper before receiving clean laundry for return from the laundry department. The latter regulation can be enforced without difficulty. The chutes down which the laundry is dumped in Huggins Hospital, and presumably in most hospitals,[3] are heavily infected. If doors on two floors are opened simultaneously, the chutes become wind tunnels which blow contaminated air out through the porthole doors into the corridors. Vertical laundry chutes are a menace bacteriologically for which no satisfactory solution has been found.

Abundant evidence from hundreds of cultures shows that, where there are large numbers of patients present and people in attendance to these patients, the level of air pollution rises, and markedly in some instances. Regardless of how intensive the clean-up effort is or of the observation that cultures taken immediately after a thorough clean-up show the number of organisms present to be reduced substantially, there is a rapid and stepwise build-back of the total numbers recoverable from exposed surfaces in a room after a period of time. The evidence also indicates clearly that air pollution is related to the amount of dust about any one area and that air pollution can be greatly reduced by effective housecleaning. It is hard to reduce and maintain in reduced form the number of organisms present as fomites when there are patients and visitors congregated in an area. How-

ever, it is possible to reduce the number of airborne organisms by the removal of dust, and, by so doing, one removes a vehicle for transportation of these organisms widely throughout a room. When people in ordinary clothing and uniforms are admitted, evidence of contamination both of the surfaces and of air rapidly rises in a room, no matter how carefully it has been cleaned previously or how short a time beforehand the cleaning was done. The rate and amount of rise are proportional to the amount of visible dirt and dust and to the volume of usage.

Maintenance of Cleanliness

The subjects which must be considered in maintenance of cleanliness are personnel, room air, masks, clothing, shoes, equipment, supplies, and procedures. A series of experiments were run in a room which had been brought previously to near-sterile conditions by an ultimate type of cleaning procedure, to which only filtered noncontaminated air was being introduced, and it was delivered to the room at a pressure which caused all air flow from the room to be outward. Observations from these tests substantiate the following statements:

Personnel will contaminate a clean room unless they are made to obey rigidly a set of strict regulations regarding masks, freshly sterilized clothing, and shoe wrapping. Regulations for cleaning for all other personnel must be identical to those imposed on members of the actual surgical team.

Proper filters can be installed and air pumps operated for delivery of any needed amount of bacteria-free air to a sterile room under positive pressure.

Unrestrained laughter and conversation and unrestricted movement about a room cause very rapid rise in bacterial content of the air in the room. Gauze masks worn during such activity delay the rate of rise of contamination somewhat, but, after 20 minutes, levels of air pollution are about equal to those in tests where no masks were worn. Pollution by respiratory exhalation can be stopped by suitable filter-type masks. Adequate masking alone will not prevent contamination of a room and its contained air.

Sterile clothing put on by personnel and then worn into contaminated areas will immediately become contaminated and will introduce contamination into a sterile room if worn back into it. The term "contaminated area" is applicable to any hospital area, such as corridor, ward, or room, which is not subject to special supervision. The practical solution to this problem lies in provision of quick-change clothing of a type that goes on and off without passage over the head or feet.

Shoes cannot be decontaminated by any practical means. Freshly autoclaved shoes worn into a public corridor and ward, and then into a sterile room, will introduce contamination into that room. Use of protective clean coverings of the entire shoes before the wearer is admitted to a sterile area is the only way yet found for eliminating contamination thereby.

Every article of furniture or equipment that enters a sterile room from elsewhere must be decontaminated first if the room is to remain sterile. This can be done by washing, autoclaving, or appropriate wiping with detergent or antiseptic solution for a sufficient length of time.

Blankets, as they are found on the bed of a patient and in use, are often heavily contaminated and will transfer infection from bed to bed or person to person if moved. Similarly, they will transfer infection when allowed to enter a sterile room if they are on a patient as a part of the covering brought with him. Blankets can be returned uniformly from the standard laundry process in a sterile condition, if subjected to treatment with the detergent-disinfectant in the final rinse of the laundry washing cycle.

Mattresses are probably subjected to less direct patient contact than are other similar items, i. e., blankets, sheets, or pillows. Generally speaking, the bulkiness of mattresses discourages personnel from making effective efforts to clean them. Repeated random cultures were taken from mattresses in constant use, and these cultures convincingly showed that they bear large numbers of bacteria. Brisk application of a detergent-disinfectant solution with a brush, and used in amounts insufficient to cause soaking of the mattress surfaces, was many times shown to be an adequate method for reduction of bacterial counts to very low levels. No issue is here raised as to the sterilizing properties of actinic rays, but it was not possible to show consistent bacterial reduction through prolonged exposure of mattresses to sunlight. The porous nature of mattress tickings offers sufficient protection for bacteria to reduce actinic radiation effectiveness. The study of how to clean mattresses clearly demonstrated the genuine benefits to be achieved by combining a bactericidal detergent agent with diligent manual intent.

Vacuum cleaners of any except the filtration type will contaminate a clean room. Those which blow air out at one end after having passed it through a cloth bag where the dirt presumably is caught carry the same or a larger number of bacteria out the back than are brought in through the front. Vacuum cleaners which use a filter retain particulate matter very effectively and are the only types which should be used in hospitals.

Although any surface or area whatever can be brought to a state of cleanliness or even sterility by sufficient mechanical cleansing and antiseptic solution application in combination, maintenance of cleanliness or sterility of the surface and of the area depends on the type and amount of usage, the frequency of rewashing by the techniques

previously enumerated, and the amount of bacteria, dust, and fomite concentration in the area where the surface is located. If ventilation and type of usage remain the same in a room, bacterial contamination of air in that room can be significantly reduced by daily application of the techniques which have been described above. Three of the very effective ways of keeping low the chance of bacterial cross infection are the use of protected dressing carts, the wearing of gloves and masks by all personnel doing dressings, and the isolation of patients harboring any infection.

Cleanliness in Operating Rooms—Base Line

Critically analytical evaluation of the cleanliness of the operating rooms, according to standards which had been established by the tests outlined in the previous section, showed that they really were not so clean as had been thought. As soon as people began to work about the rooms there was too much dust in the air. The powder on gloves was one source, and a film of this powder was making a good culture medium as it settled into crevices in corners. The inside of light fixtures contained dust particles which were shaken into the air as the lights were moved about. The undersurface of tables, adjoining surfaces on cabinets, and many other places normally thought of as having been cleaned could be shown to have fingerprints of grease spots. Dust or dirt could be taken off the wheels of the cart that brought the patient from the ward to the operating table if one sought for the dirt with a wet cloth. Anesthesia equipment and suction machines yielded positive cultures.

The use of powder in the operating rooms was stopped. The entire pavilion was subjected to the ultimate noncompromising type of mechanical cleansing that had been proved effective elsewhere, and a supervisory program was established which maintains this status each day and every day. When this had been done it was found that there was, for the first time, a base line of reliability. From this basis, studies were made which were not only consistent with common sense but also free of the frustrating, erratic irregularity and unpredictability that was characterizing attempts to study other factors before this base line of absolute room cleanliness was established.

The exact origin of a wound infection often is difficult, if not impossible, to assign. Many observations have led to suspicion that most of the sporadic infections of clean wounds at Huggins Hospital have occurred in the operating room. They have been deep seated. They have been heralded by deep cellulitis with subsequent manifestations superficially, and they have been accompanied by systemic reactions. The appearance has been different from that of a superficial or stitch abscess, which subsequently shows signs of subcutaneous involvement. In fact, nine-tenths of the contaminations that cause wound infections are believed to arise in the operating pavilion area, from entry into the wound of germs from the air, or from fomites about the personnel and patients, including those of the patient's skin. The physical areas and the number of personnel involved, therefore, are small compared to the hospital space and employees for the hospital as a whole.

Cleanliness in Operating Rooms—Air

An efficient air conditioning system can readily be made to deliver dust-free and nearly sterile air into a room at a higher pressure than the atmosphere or adjacent areas by one of several effective ways. After testing of various methods, the type of air conditioning found to be best for Huggins Hospital operating pavilion was the use of filters alone.[4] Filtered air is delivered to each of two operating rooms through a central duct in the ceiling. It is removed in part by suction outlet ducts in side walls near the floor and at a height of 7 ft. and in part by a constant flow of air outward through the crevices around the doors and into an intermediate room lying between the two operating rooms. From this entryway or intermediate room, air again passes outward under positive pressure through another set of double doors to a short passageway. The passageway connects at either end with a dressing room and on the opposite side to a public corridor.

Air sampled as it entered the operating rooms through the ducts was repeatedly demonstrated to be sterile. There was a constant flow of air outward, even when the doors were opened, and yet sporadic instances of infection were appearing and these seemed to be originating during the course of the operative procedures. Furthermore, each of these rooms carries an ultraviolet light installation with demonstrable germicidal intensity of 90% killing power at 10 minutes, at a height of 8 ft. It was shown repeatedly, by sieve samplings on many occasions, that air delivered into the rooms as above described would remain sterile when the room was not in use. As soon as usage started, the bacterial counts would gradually rise to levels which were undesirable.

Practically speaking, infection or contamination of a clean room that is receiving only clean air into it is introduced by exhalations of personnel entering the room and by fomites from the clothing, shoes, or objects that people entering the room bring with them. Much study of the air filtration problem in reference to personnel has been done in the mining and fumigating industries.[5] In these industries the problem is largely one of protecting the personnel from the atmosphere or environment. They are concerned with taking fumes and particulate matter out of the air which is to be inhaled by the personnel.

The problem is reversed in surgery, and one is concerned mainly with protection of the atmosphere against germs exhaled by personnel in order that it may not be contaminated and transmit infection to the patient or his open wound. For

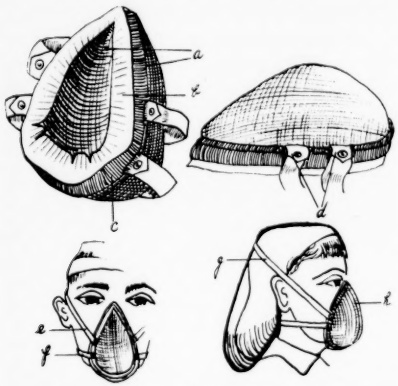

Fig. 1.—Fitted filter masks: *a*, inner and outer wire screening, *b*, adapter ring of autoclavable fiber foams, *c*, spring-constant adaptability to facial contours, *d*, snap-on elastic structural holders, *e*, elastic headband, *f*, detachable elastic band, *g*, best positions for wearing bands for holding mask, *h*, mask formed to maintain complete central vision.

many years, the traditional gauze mask has been worn in recognition of this problem and as one attempt at solution. Unfortunately, gauze masks are of negligible efficiency insofar as protection of room air against bacteria contamination is concerned. Doubling the masks and changing them at frequent intervals, such as once an hour, was tried with the thought that this might be a tolerable answer. There is a discernible barrier effect directly in front of a dry gauze mask and, more noticeably, in front of doubled dry gauze masks for short periods of time after they are put on. This protective effect diminishes rapidly as the mask becomes moist, is related to the amount of talking or forcefulness of breathing, and is down to less than 10% efficiency after 10 minutes if the wearer is also talking. However, there is a billowing-out effect around the sides of these masks from the beginning of wearing, no matter how carefully they are applied. With use of sieve sampler techniques one can gather large numbers of bacterial colonies from air emerging beneath the sides of these masks from the moment that they are put on.

Therefore, an extended study was made of the masking problem in search of an efficient answer that would also be a comfortable one for the wearer. A mask made as a common gauze mask and simply containing a filter instead of a piece of gauze is really little better than the gauze. It will stop the direct passage of bacteria through the mask, but the billowing out effect is unchanged. In fact, the situation can be made even worse than by a gauze mask if one chooses a completely impervious mask and substance to put in front of the nose and mouth. The spill-over effect is then aggravated. An essential feature of any filter mask that really makes tight and nonleaking contact with the skin of the wearer is that it have an exchange reservoir. Otherwise, the wearer will have a sense of suffocation and of partially obstructed air exchange both inwardly and outwardly. A mask which is doing its job effectively will also cause moisture accumulation within the reservoir, and some means of absorbing this moisture must be provided. An interchange surface must be available of such area and characteristics that air may pass through the filter with stoppage of bacteria, but at a rate which will provide adequate oxygen availability and carbon dioxide dispersal and, simultaneously, cause neither significant suction effect during inspiration nor positive pressure effect during expiration. The mask must be light and comfortable. It must be of high efficiency at the end of many hours of use. It must be cheap enough to throw away or be completely sterilizable and easily maintained.

After testing a dozen ideas which had to be discarded and over a score of models which proved not to be good enough for one reason or another, a filter type of mask (fig. 1 and 2) was finally developed and produced which meets in practice the stringent criteria set in the preceding paragraph. Demonstrations of almost total efficiency have been accumulated on a group of different personnel, tested for periods in excess of five

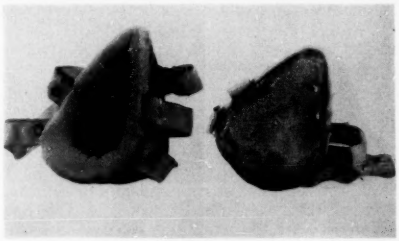

Fig. 2.—Fitted filter mask.

hours. As an outcome of the numerous tests of this type of properly fitted filter mask, it may be stated that air contamination of a room by human exhalation is at least 98% preventable and controllable by proper masking of all persons entering the room. Such masks are now available, usable, and proved in practice.

The patient is masked, just as are members of the operating team. Anyone entering an operating room, at any time and for any reason, should be properly masked before entering and should wear the mask during his entire stay there. This statement applies to the clean-up period after operation, insofar as trained personnel is concerned. It applies also to cleaning and maintenance help. No exceptions to wearing of proper masks should be permitted.

Air contamination was drastically reduced after adoption of this type of mask and insistence on its constant use by all persons entering the operating

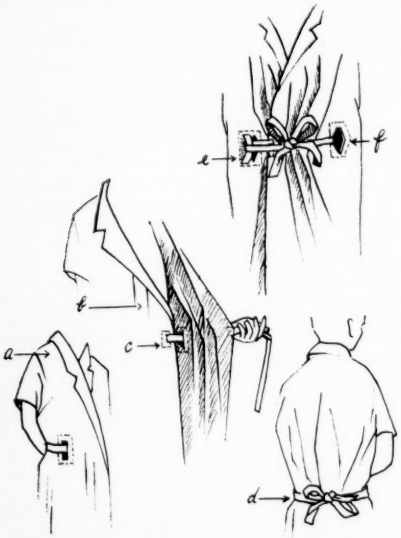

Fig. 3.—Wrap-around, quickly changed gown: *a*, reversible collar, *b*, double-breasted front coverage, *c*, pass-through opening for tie cord, *d*, tie in back, *e*, strap for front tying, *f*, pass-through opening for reverse position.

room, as shown by the following data: On July 18, cultures from operating room suite 1 showed a sieve sampler count of eight colonies on a plate, three of which were weakly hemolytic. This was the status after the room had been made ready for use during the day. Cultures from operating room suite 2 showed 23 colonies per plate after one hour of use. In the entryway leading to the operating rooms, a count of 17 colonies per plate was found. In the nurses' dressing room on the same morning, the count was 53 colonies on a Petri plate. On July 22, efficient filter masks were worn and cultures from suite 1 showed six colonies and those from suite 2 showed three colonies per plate after an hour of use. The entryway to the operating rooms showed nine colonies. The doctors' dressing room showed 55 colonies. In other words, there was a noticeably good effect from the adoption of efficient filter masks, but a condition of full sterility was still further from attainment than seemed desirable and possible.

Cleanliness in Operating Rooms—Clothing

A more careful scrutiny was therefore made of clothing. A freshly autoclaved gown was put on and worn for the five minutes required to change a dressing on a patient known to have an infection with Proteus organisms. Care was taken not to touch the gown with the gloved hands, and reasonable care was exercised in protecting the gown from contact with the bed, in the same manner as when changing a dressing while wearing street clothes or operating room clothes. Cultures taken immediately afterward from this gown yielded Proteus organisms. Culture was taken from a clean operating room uniform and subsequently showed no growth. The uniform was then put on and worn for 45 minutes in the course of routine early morning rounds (presumably clean), before scrub-up for the first operation. No dressings were taken down. The hands were washed each time after a patient had been examined. The clothing was known to have come in contact with several beds, but only in the manner that is normal in the making of rounds. At the end of rounds, the uniform was taken off and cultures taken. These showed contamination of the uniform by a wide variety of mixed organisms. Additional tests of a similar nature were carried out on subsequent days.

Proof was accumulated that all clothing worn in a nonclean room, for however brief a time, is almost surely contaminated by fomites and that such clothing will introduce contamination into a clean room if worn into that room. For example, a clean nurse's gown was put on and worn for the two minutes required for the nurse to leave the operating pavilion, cross a public hallway, and enter a recovery room for delivery of a flask of solution. She returned immediately to the operating pavilion and the scrub gown was shown by culture to be contaminated by a mixture of bacteria. The bottoms of men's trousers are among the worst sources of bacterial spread in this manner. Not only are they likely to be soiled by passage over filthy shoes, but they flap with walking and their nearness to shoes, the floor, and the dust usually present on a floor makes them an infection hazard. After starting these tests, we rapidly realized that the frequent trips in and out of an operating pavilion for doing of chores and errands, as is so common a practice and need with physicians and nurses, is hazardous from the standpoint of contaminating an operating room.

Thereafter, a long series of studies was done with respect to how the obvious inconvenience of the necessary change of clothing might be overcome in order to be wearing freshly sterilized clothing on each entry or reentry of the operating room and to fulfill the strict requirements of operating room area protection. This element of protection is essential in respect to clothing worn by personnel of all types, whether senior surgeon, intern, pavilion supervisor, scrub nurse, anesthetist, instrument maid, cleaning man, or anyone else, without exception. We sought to devise clothing that would permit quick change with little loss of time and scarcely any risk of contamination in the process of changing. Such a garment should be quickly resterilizable, reasonably good-looking, and comfortably acceptable to those who would need to wear it. After a succession of 18 trials and models, a sexless, sizeless, sideless, quick-change, double-breasted gown was developed that seems to meet the above requirements satisfactorily (fig. 3 and 4). One garment can be taken off and a new one put on within 30 seconds. It provides protection against exposure, ties in the back, and has no need to be turned in respect to sleeves, as both sides are identical. It will overlap in either direction in recognition of the different habits of men and women in putting on garments, and it is given rough-dry laundering to save ironing expense. This is the only practical garment yet found for wear in clean rooms where frequent exit and reentry are necessary. A freshly sterilized gown of this type is put on for each reentry of an operating room.

Cleanliness in Operating Rooms—Shoes

Shoes are an article of clothing, and all statements previously made about clothing in general are applicable to shoes in particular. Additionally, shoes present surfaces and are specifically subject to the rules for attaining cleanliness outlined in the early part of this paper in respect to the cleaning of rooms and the furniture within rooms. By nature of their function, shoes are always dirty, from a bacteriological standpoint, and 10 minutes' time spent in mechanical scrubbing with a good disinfectant-detergent is the only method discovered that will suitably clean them. This fact makes decontamination of shoes, before reentry to a clean room in active use, impractical and impossible of attainment.

A shoe that was cultured without having any treatment at all showed a massive growth of a mixed flora of bacteria. A second shoe that was soaked in a 10% phenol detergent solution for one minute showed a relatively high number of bacteria growing out from a swab passed over the sole. The same was true of another shoe that had been treated with pure phenol. When shoes that had been soaked for one minute in each of these strengths of solutions were scrubbed vigorously with a brush for 30 seconds, the number of viable organisms remaining dropped off markedly. However, 10 minutes of vigorous mechanical scrubbing was necessary in order to render a previously dirty shoe surface sterile to culture. It is of interest to note that the antiseptic detergent solutions were fully active in their bactericidal effect, insofar as they were able to come into direct contact with organisms present. Where there is some protective effect afforded through the presence of a layer of dirt, this bactericidal action is inhibited and organ-

Fig. 4.—Wrap-around, quickly changed gown.

isms are readily grown on culture mediums. It is now apparent that, in order to have an effective shoe-soaking arrangement, one would need to set up a brush or series of brushes over which the shoe could be scrubbed while being wetted with an antiseptic solution and that one would need to carry out this activity for 10 minutes if he expected to produce a sterile shoe surface. There is nothing really surprising in the finding, except that anyone should ever have thought that simply wiping

ordinary shoes with a detergent cloth would decontaminate them. No one should believe, any longer, that a surgeon's hands can be sterilized by dipping them in a detergent solution or even by washing them for a minute or two with some such solution. Every serious student of the subject knows that a good, enthusiastically applied, 10-minute mechanical scrubbing is necessary to clean a surgeon's hands. Why should it be supposed that his shoes would require much less?

This intensive study of the problem of protecting the operating suite against contamination from shoes worn by personnel yielded reaffirmation of the axiom that mechanical energy must be expended on the surface of whatever is to be cleaned.

Fig. 5.—Conductive, protective bootie: *a*, front tie, *b*, wrap-around for complete coverage, *c*, weight to cover both shoe and sock, *d*, rubber strap conductor coming to skin contact, *e*, conductive rubber soles.

Phenolated detergents, chlorinating compounds, iodine, benzalkonium chloride, in whatever strength of tincture, formulation, or solution, all are ineffective unless combined with mechanical effort.

Attention was turned to other methods. After extensive testing and modeling, a washable, flexible, slip-on, wrap-around, cloth-top, conductive rubber-soled bootie was developed and produced that meets all requirements (fig. 5 and 6). It is worn by everyone while they are in the operating rooms or adjacent rooms. They may be worn outside of the operating pavilion at will but must be discarded and a freshly cleaned pair put on before reentry is permitted. They may be worn out of the operating rooms and into the dressing rooms only without being changed before reentry. This is a satisfactory compromise with practicality, in that the soles of the booties are readily cleansed by wiping them on a blanket soaked in detergent antiseptic solution after such brief exposure to a relatively clean area.

Comment

What was true in other areas is true in this: 1. An operating pavilion can be cleaned up by mechanical effort, application of detergents and antiseptic solutions, and persistent attention to details of care. 2. An area so cleaned will remain clean until contamination is introduced into it. 3. Personnel can so conduct themselves in respect to the masks, clothing, and shoes worn that they need not introduce infection to a room by virtue of their presence in the room. 4. The air introduced into a room through the conditioning system can be delivered sterile or nearly so. 5. All inanimate objects taken into a room can be delivered there in clean or sterile form. In other words, the problem of maintaining sterility, or conditions so nearly sterile that they can be regarded as totally clean, is a soluble one in respect to a given room. The solution can be kept within economically practical bounds for a relatively small area, such as an operating pavilion, because of the geographical confinement and because of the high level of intelligence, understanding of need for cleanliness, and dedication that characterizes the attitudes of most persons who work about operating pavilions.

The following absolutes of sanitation must prevail and are the criteria for attaining and maintaining a bacteria-free operating room. There is an inner zone, the operating room itself, where uncompromisingly rigid and total requirements of sanitation are constantly in effect. Every item admitted to this environment must be as nearly germ free as it is possible to make it. An interchange area exists inside which all aseptic criteria are fulfilled: the shoes are wrapped in booties, the clothing is clean, and a filter mask is worn. The interchange area itself, where these conditions are established on passing inward, contains the scrub-up sink. Impervious aprons are required during scrub-up to prevent wetting of the clothing with droplets from scrub brushes.

A zone lies outside of the interchange area where complete cleanliness in reference to the room and floor and furniture is maintained. But here masks are not worn. Booties may or may not be on. Pavilion clothing may be worn or not. These areas are the dressing rooms and the entryways to these rooms and to the interchange zone. They lie outside the interchange zone but within the operating room pavilion.

Outside of the pavilion is the rest of the hospital. From the standpoint of protection against germs, the area outside the pavilion is outside the pale and includes everything and everybody.

On the floor of the interchange area there is a blanket 6 ft. wide extending from wall to wall; this is put down freshly washed each day and is soaked in a disinfectant detergent solution. When a transfer cart brings a patient to this zone, the cart is stopped on the blanket and the patient is transferred to the operating room cart. If a recovery room cart is taken into the operating room itself, the cart is first washed with antiseptic solution, including the wheels and tires. The clothing and covering which the patient is to wear in the operating room are put on him in the interchange area.

Personnel put on their masks in the interchange area or outside it. They put on their booties from the sterile supply while sitting on stools on the detergent–antiseptic–soaked blanket in the interchange area, so that the booties present over-all sterile surfaces from the time the protected area is entered. If a person must leave the protected area temporarily to go into a dressing room, the gown may be worn back into the protected area, as may also the booties if their soles are wiped off on the wetted blanket. This is germicidally effective because there is little dirt or dust in the air or on the floors of the dressing room or operating pavilion. The booties have been washed and are always thoroughly clean prior to the current wearing, and the soles are therefore readily cleansed to meet practical requirements.

Although such conditions can be sought and temporarily achieved in other departments of the hospital, such as wards, kitchen, bathrooms, laundry, and examination rooms, one must concede that there are not enough people with requisite supervisory skill or dedication to work for fulfillment of these requirements beyond a limited zone. There is a difference between what can be proved and what can be done, unless one is able to provide total, constant supervision. Fortunately, the area of a hospital in which such exacting standards of performance must be met is the same one where they can be maintained in ways that are practical, economical, and reasonable.

A concept of this whole problem of operating room protection is as follows: There is a certain area, which is the operating room itself, where ideal performance is a minimum requirement. There is an outer area, the public area, where contamination is universal and controllable only within limits. Between these extremes, there must be degrees of sterility which increase as one moves inward but where some leeway in the intermediate zone is necessary.

The practical effect of willingness and ability to carry out this program on a daily basis is shown by the following reports on cultures taken by a bacteriologist, without prior announcement to anyone that he had plans to take them and at the end of a period of time in which two operating rooms, the entryways, the interchange zone, and the dressing rooms and associated passageways had been steadily in use for four hours. Five-minute air samples were taken by a sieve sampler technique. Operating room 1 showed two colonies. Operating room 2 showed one colony. The scrub room or separation room between the two operating rooms showed 14 colonies. Eleven colonies were obtained in the hallway between the dressing rooms and 20 colonies in the nurses' dressing room. At the same hour, for purposes of comparison, culture samples were taken from a public hallway outside the operating pavilion, and this showed 49 colonies, 15 of which were potently hemolytic and 2 of which were soil organisms. A plate exposed in the men's ward showed the presence of 61 colonies, of which 12 were hemolytic, 6 were potent hemolizers, and 1 was a soil organism.

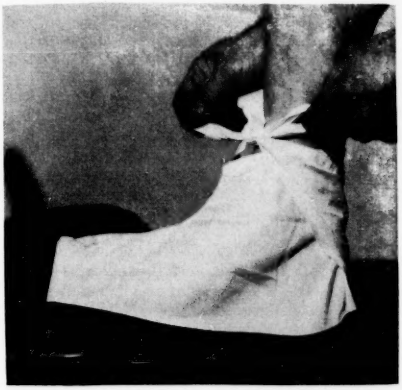

Fig. 6.—Conductive, protective bootie.

The skin of a patient can be cleansed in the same manner as can the skin on the hands of a member of the operating team. Nothing less than a 10-minute, enthusiastically applied, mechanical washing with detergent soap solution and water, followed by a process of drying and application of antiseptic solution, will suffice. The proposition that skin on the hands of personnel should be covered by thin, sterile, impervious material, such as rubber or plastic gloves, has been accepted and universally applied for three generations. The skin of the patient has not been similarly treated and has remained a source of risk to wounds, even though precautions to cover skin margins and subcutaneous tissues, and other protective measures, were taken.

Recently, a thin, transparent, autoclavable, plastic film material (Vi-Drape surgical film) has become commercially available. It is capable of being

made adherent to the skin by the application of a spray-on adhesive bond (Vi-Hesive surgical adherent).

The adhesive bond is first sprayed on slowly at a distance of 10-12 in. over the whole scrubbed area and allowed to dry for 30 to 45 seconds, until tacky to touch. The sterile film is then held over the area, lowered first over the areas of intended incision, and then molded onto the skin over the whole operative site. The usual surgical drape is then applied.

This technique has become an integral part of the draping and preparatory procedures to further isolate the wound from its environment prior to making the skin incision, which is made through the plastic material. The latter remains intimately adherent to the skin margins, and the skin, although visible, is completely occluded from the operative area for the duration of the procedure. The adhesive bond lasts for at least many hours, and protection against contamination of the operative area from the skin can be maintained indefinitely by the sterile impervious plastic membrane.

These materials have now been used in over 300 surgical cases. They are in no sense a substitute for scrupulous and meticulous skin preparation but are an added protection of the patient's skin, equal to that afforded by gloves on the hands of operating personnel.

Summary and Conclusions

Extensive studies of sources of infections in hospitals led to recognition of the following fundamental facts: Frequently repeated, intelligently applied, mechanical effort in combination with a good disinfectant-detergent will clean any area. Maintenance of cleanliness or sterility of the surface depends on the type and amount of usage, the frequency of rewashing by these techniques, and the amount of bacteria, dust, and fomite contamination.

If ventilation and type of usage remain the same, bacterial contamination of air in a room can be significantly reduced by daily application of proper cleaning techniques. An efficient air conditioning system can readily be made to deliver dust-free, nearly sterile air into a room under positive pressure. Such air, delivered into a clean room, will remain nearly sterile indefinitely, unless contaminated by introduction of infection. This is introduced by exhalations of personnel entering the room and by fomites from clothing, shoes, or objects brought in.

Air contamination of a room by human exhalation is at least 98% preventable and controllable by proper filter masking of all people entering the room.

All clothing worn in a nonclean room, for however brief a time, is almost surely contaminated and will introduce contamination into a clean room. Because of problems of time consumed, inertia, and contamination from passage over unclean areas of trousers or slip-on garments, double-breasted, wrap-around, quick-change, lace-tying gowns are the only practical answer yet found for wear in clean rooms where frequent exit and reentry are necessary. A freshly sterilized garment of this type must be used for each reentry of a clean room. If used where there are flammable gases, the garment must be constructed of a material which will not produce static electricity. All statements made about clothing are applicable to shoes. Quickly donned, temporary shoe coverings are a practical solution to attainment of clean footing for all personnel using a clean room. Fresh coverings must be used each time a clean area is to be entered. If flammable gases are used in the clean room, the shoe coverings must have conductive soles as an integral part of their construction, and these soles, as well as the tops of the coverings, must be sterilizable by autoclaving. Critically competent supervision and working personnel with attitudes of dedication to maintenance of cleanliness are necessary.

Nine-tenths of the causes of wound infections are believed to arise in the operating pavilion area from entry into the wound of germs from the air or from fomites about the personnel and patient, including those of the patient's skin. The geographical area and the number of personnel involved, therefore, are small compared to the hospital space and employees for the hospital as a whole. A sterile skin surface can be achieved by 10 minutes of diligent scrubbing with germicidal detergent soap and water. The sterility of this surface can be maintained indefinitely by the proper application of an adherent transparent plastic film.

A room which looks clean, smells clean, and feels clean is most likely to be clean and to be proved clean also when subjected to critical testing for bacterial and particulate matter content. For nine-tenths of the hospital, a good housekeeper with an eye for dirt and an ability to get it removed is a better investment than complicated bacteriological testing equipment and routines. For the other one-tenth of the hospital area, meaning essentially the operating pavilion and the nursery, standards, controls, and fulfillment must be of the ultimate type from which no appeal for leniency is tolerable.

The detergent-disinfectant uesd in this study was supplied as Tergisyl and the *o*-phenylphenol—*p*-tertiary amylphenol as Amphyl by the Lehn & Fink Products Corporation, Bloomfield, N. J. The plastic surgical film material was supplied as Vi-Drape surgical film and the spray-on adhesive bond as Vi-Hesive surgical adherent by the Aeroplast Corporation, Dayton, Ohio.

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EXPERIMENTAL PANCREATITIS—RECENT CONTRIBUTIONS

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The fact that pancreatitis and disease of the biliary tract frequently occur together has led to many types of experiment on possible interactions between bile and pancreatic juice. Especially tempting is the hypothesis that some constituent in bile, in tissue juices, or in inflammatory exudates is capable of activating pancreatic juice and so causing the familiar picture of hemorrhagic necrosis of the pancreas. There is also a tendency to assume that the appearance of abnormal enzymes in the circulation during pancreatitis means that they were produced in the pancreas and are responsible for the symptoms of shock. In reality, the injurious factor in pancreatitis has not yet been identified, and the role played by circulating proteases remains to be explained.

Many methods for producing experimental pancreatitis are available, and descriptions of new methods are constantly appearing. All forms of experimental pancreatitis bear some resemblance, in gross and microscopic pathology, to certain forms of the human disease. This resemblance is best interpreted as indicating that the reaction of the pancreas to injury is rather stereotyped, differences in the pathological picture being due more to the rate and amount of injury than to the nature of the injurious agent. For this reason, caution must be used in arguing from experimental pancreatitis to the pathogenesis of the human disease.

Several recent reviews systematically survey the literature on experimental pancreatitis.[1] This paper will not attempt to duplicate these efforts but will deal only with selected topics which invite evaluation in the light of recently acquired evidence.

The Bile Factor

The frequent association between disease of the biliary tract and pancreatitis is a well-documented clinical fact. Of the various theories which attempt to explain this association, that of Opie, postulating reflux of bile into the pancreatic duct through a common channel, is dominant in terms of the number of adherents it commands. That a communication frequently exists between the common bile duct and the major pancreatic duct of human subjects has been clearly established on the basis of both anatomic dissections and operative and T-tube cholangiography. However, the question of whether bile actually refluxes through this communication under physiological or pathophysiological conditions has not yet been unequivocally answered. The pressures used during direct cholangiography are artificially high and do nothing more than demonstrate that the communication exists. The availability of intravenous cholangiography offers the opportunity of detecting biliary-pancreatic reflux under conditions of spontaneously occurring pressure. To my knowledge, no one has yet demonstrated biliary-pancreatic reflux by intravenous cholangiography in normal subjects or in patients with pancreatitis, with or without administration of opiates. A careful search for this phenomenon should be made.

Assuming that reflux of bile into the pancreatic ducts can occur, will it cause pancreatitis? Critical evaluation of the enormous literature on this subject leads to the conclusion that pancreatitis results from injection of bile into the pancreatic ducts only when the pressures used are great enough to cause mechanical rupture of the acini. It is unlikely that pressures of the magnitude required ever occur under physiological conditions.

New light on the possible role of bile in the pathogenesis of pancreatitis comes from the studies of Elliott and co-workers.[2] These investigators have

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confirmed the findings in earlier studies by showing that, when gallbladder bile was allowed to flow into the pancreatic duct under relatively low pressure (40 cm. H_2O), little entered the gland and no significant damage resulted. However, if the bile was incubated with pancreatic juice of high enzyme content or with trypsin for 12 hours before allowing it to flow into the pancreatic duct, then large amounts entered (18 to 30 ml. in one-half hour) and lethal hemorrhagic necrosis ensued. Presumably, the proteolytic enzymes of pancreatic juice degrade a substance in bile (perhaps mucoprotein) which modifies the ability of bile to penetrate and injure the pancreas. As early as 1906, Flexner [3] showed that the injurious agent in bile is bile acid and that it is more effective in producing pancreatic damage when freed of the protein of bile. Whether such an interaction of bile and pancreatic juice can occur in the intact organism remains problematic.

Pressures in the Pancreatic and Biliary Ducts

Most of the earlier studies on pressures in the pancreatic and biliary ducts were concerned with so-called secretory pressures, that is, the vertical height to which fluid would rise in a tube connected to a cannula occluding the duct. Menguy and associates [4] have recently devised a method for making serial pressure measurements in the physiologically intact pancreatic and biliary ducts of unanesthetized dogs over periods of many months. These studies have shown that, even during fasting, remarkably high pressures are present, the mean value for the pancreatic duct being 14 cm. H_2O and for the biliary duct 7 cm. Stimulation of the flow of juices in these ducts by meals or by injection of secretin or dehydrocholic acid usually, but by no means always, caused a modest increase in pressure.

Since large increases in flow rate can occur with little or no increase in pressure, it is valid to deduce that resistance to flow is subject to marked physiological adjustment. Conversely, it has been clearly demonstrated that when outflow resistance is increased no decrease in rate of flow occurs until the outflow resistance approaches the level which will produce complete cessation of flow.[5] Thus, unlike a water tap in which flow is inversely proportional to outflow resistance, the pancreatic gland is capable of increasing intraductal pressure in response to increased outflow resistance so as to maintain flow constant. Whether the increased intraductal pressure which results from partial obstruction to outflow can be sustained for long periods of time and, if so, whether it would lead to damage to the gland has not yet been studied.

Of special interest in the studies of Menguy and associates was the demonstration that introduction of alcohol into the duodenum caused a sustained rise in pressure in the pancreatic duct. The association between acute and chronic alcoholism and pancreatitis is evident clinically, and information about the physiological effects of alcohol on the pancreas is, therefore, important.

Vascular Factors

The recent studies of Thal and co-workers [6] have convincingly reasserted the effectiveness of ischemia in producing fulminant lethal hemorrhagic pancreatitis. When the capillaries and venules of the pancreas were made to undergo thrombosis by the local Shwartzman or Arthus phenomenon or were severely constricted by introduction of staphylococcic toxin through the duct, typical diffuse hemorrhagic necrosis rapidly ensued.

By contrast, it has once again been demonstrated, in the studies of Menguy and associates,[7] that ligation of the major arteries and veins of the pancreas produced only small patches of necrosis, although when such ligation was combined with obstruction of the ducts the severity of injury was increased. The severe hemorrhagic pancreatitis which Pfeffer and co-workers [8] produced by creating a closed loop obstruction of the portion of the duodenum where the pancreatic ducts enter is another example of the cooperation of obstructive and ischemic factors.

Two principles emerge. First, because of the richness of the collateral blood supply to the pancreas, ischemia of the tissue sufficiently severe to produce necrosis, when acting alone, can only be achieved by stopping the flow of blood in the smallest vessels. Second, lesser degrees of ischemia can greatly enhance the damaging effect of other factors such as obstruction of the duct.

Pancreatic Proteases and Lesions of Pancreatitis

It has long been assumed that the proteolytic enzymes of pancreatic tissue and of pancreatic juice play an important role in producing the lesions of pancreatitis. It is well established that both trypsin and chymotrypsin, when present in sufficiently high concentration, are capable of producing severe tissue damage at the site of their local injection. A prominent feature of this damage is necrosis of the walls of vessels and associated tissue hemorrhage. The hemorrhage with vascular necrosis seen in pancreatitis is comparable to that produced by injection of the pure enzymes, and this similarity is, to date, the strongest evidence available implicating these enzymes in the pathogenesis of the disease.

When trypsin or chymotrypsin is injected intravenously in a sufficiently large amount, death associated with shock occurs. The pathogenesis of this effect is uncertain, although there is evidence to suggest that it is due to release of vasoactive substances, such as histamine. Similarly, the damaging action of proteolytic enzymes injected into tissues may be dependent on local release of vasoactive substances which lead to ischemia.[9] It is often assumed that the shock which sometimes occurs in

patients with pancreatitis is due to release of active proteases into the blood stream. Although many attempts have been made to demonstrate active pancreatic protease in the blood in both experimental and clinical pancreatitis, no convincing evidence for their presence has been adduced. Blood plasma has powerful antitryptic and antichymotryptic activity, and the amount of enzyme present in the blood must be great enough to overcome this inhibition before it can be measured.

Several groups of investigators have demonstrated a circulating protease in experimentally induced pancreatitis,[10] but it has not been proved that this protease is actually of pancreatic origin. Blood contains a proteolytic enzyme, plasmin, present mainly as an inactive precursor, plasminogen, and the blood concentration of both the precursor and the enzyme rise after a wide variety of nonspecific stresses, such as surgical operation.[11] Plasminogen may be converted to plasmin by a kinase of bacterial origin, streptokinase, which is incapable of activating pancreatic proteases. It has recently been demonstrated that there is elevation of the concentration of plasminogen as well as of an active protease with the properties of plasmin in animals with experimentally induced pancreatitis.[12]

In addition to their hydrolytic action on peptide bonds, pancreatic proteases have been shown to be capable of hydrolyzing a variety of amino acid esters and amides. The possibility of using these synthetic substances for detecting pancreatic proteases in the blood of patients with pancreatitis is receiving attention currently. Because blood plasma inhibits the esterase action of trypsin and chymotrypsin less than their protease action, it is possible to detect these enzymes by esterase measurements in the blood of animals after intravenous injection of amounts which produce neither shock nor death.[13] These methods offer great promise for elucidation of the pathogenesis of the experimentally produced and the clinical disease. However, these synthetic substrates are attacked by enzymes other than those of pancreatic origin. For example, arginine esters and arginine amides are split by trypsin, but they are also attacked by plasmin, thrombin, and tissue cathepsins.[14] In order to prove that elevation of the rate of splitting of such a substrate is due to pancreatic protease, it will be necessary to employ a variety of criteria, such as relative rate of splitting of different substrates and pH optimums. The recent report that patients with pancreatitis show an increase in the blood level of an enzyme which hydrolyzes benzoyl arginine amide [15] must be viewed in this light.

The proteolytic enzymes of the pancreas, trypsin and chymotrypsin, are secreted into the pancreatic juice in the form of inactive precursors, trypsinogen and chymotrypsinogen. An enzyme secreted by the intestinal mucosa, enterokinase, converts trypsinogen to trypsin. Once this process has begun, it proceeds rapidly because it is autocatalytic in nature, that is, trypsin catalyzes the conversion of trypsinogen to trypsin. In addition, the transformation of chymotrypsinogen to chymotrypsin is accomplished by trypsin, and this reaction is not autocatalytic.

In the literature on the pathogenesis of pancreatitis, one frequently encounters the statement that the conversion of pancreatic proteases from their inactive precursor forms to the active enzymes can be accomplished by a variety of agents other than enterokinase, including bile, tissue juices, and inflammatory exudates. It is thus assumed that if these enzyme precursors find their way into intercellular sites they will rapidly become activated.

This problem has recently been studied in detail. Pancreatic juice was collected from the ducts of unanesthetized rats and dogs with food acting as the stimulus for secretion. It was found that these juices invariably contained a trace of active protease but that this usually represented less than 1% of the potential proteolytic activity which could be released by activation with enterokinase. When tested on synthetic substrates which are attacked by trypsin, this spontaneously appearing active protease did not produce any hydrolysis. Another indication that this spontaneously active protease was not trypsin was the fact that when minute amounts of crystalline trypsin, equivalent in proteolytic activity to the spontaneously appearing protease, were added to the juice full activation, as great as with enterokinase, occurred within a few minutes.

A variety of substances were added to pancreatic juice to test their ability to produce activation of protease. Rat hepatic bile, dog gallbladder bile, 2% solution of sodium cholate, inflammatory exudate produced by injection of turpentine into the thoracic cavity of rats, an aqueous extract of human leukocytes, plasmin, thrombin, and streptokinase were tested. None of these substances, with the exception of thrombin, produced any increase in the rate of appearance of active protease over that seen with pancreatic juice alone during periods of observation up to 24 hours. The weak activating action of the thrombin preparation could be fully accounted for by its content of calcium. Calcium salts in a concentration of 0.05 M caused complete activation of pancreatic protease. The activation by calcium salts, which had been extensively studied by a number of earlier workers, is characterized by a long lag phase, during which only slight acceleration of activation occurs, followed by very rapid, presumably autocatalytic, total activation.

Unactivated pancreatic juice was injected into the thoracic or abdominal cavity of rats, and samples of it were periodically removed for assay of proteolytic activity. The increase in concentration

of active protease over a six-hour period was slower than that of a similar solution incubated in vitro at 37 C.

These results offer no support for the view that tissue juices, bile, or inflammatory exudates are capable of activating pancreatic protease. The important problem of whether pancreatic proteases become activated during the course of clinical or experimental pancreatitis and, if so, how this is brought about, awaits a definitive answer.

Conclusions

The experimentalist could easily be beguiled into thinking that he knows a great deal about the etiology of clinical pancreatitis because he can so easily mimic the disease in animals. Actually, what is known is that there are a number of factors which can cause injury to the pancreas and that when this gland is injured it reacts in certain characteristic ways. The identification of the injurious factor or factors in the clinical disease has not yet been accomplished.

The experimentalist can be equally naive in regard to the pathogenesis of the disease. It is plausible and useful to hypothesize that injury to pancreatic acinar cells causes release of enzymes into tissue spaces and that these enzymes then produce characteristic types of damage and reaction. While this hypothesis is almost certainly valid in a general sense, its intimate details are but poorly understood.

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NEW WORLDS AWAIT SENIOR CITIZENS.—From the accent on youth the time has come to recognize and develop the concept of maturity. From being sickness-oriented there is need for becoming positive-health-minded. From emphasis on chronological age the more accurate estimate of an individual is his biological or fitness performance capacity. From limiting the medical focus to the requirements of the individual there is a broader aspect, the family and the impact of disease on its group vitality. Acute diseases are now relatively less important than long term disorders and the necessity for their prompt control. Finally, the barriers of age retirement must be re-examined, and thought now should be directed to the second career. Family values, happiness and security, are rooted in the vitality, health and unity of each member. The healthier each one is, the healthier the family. A kind of crisis now exists in too many families where the older members are devaluated. No one can help the elder as much as he can help himself. A whole new world awaits the senior citizen who will become alert to his potentials.—E. L. Bortz, M.D., The Emerging Twentieth Century Family, INA Conference on Family Security, Disneyland, Calif., Jan. 9-12, 1959.

MEDICAL ASPECTS OF PANCREATITIS

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The diagnosis of acute pancreatitis usually depends on the finding of a high serum amylase level in a patient with acute severe epigastric pain, abdominal tenderness, vomiting, fever, tachycardia, and leukocytosis. Increasingly exact methods of diagnosis have led to increasingly conservative methods of treatment. Therapy includes continuous aspiration of gastric contents, parenteral administration of solutions to preserve the water-electrolyte balance and combat shock, and use of antibiotics. The treatment must be adapted to the case, and surgery may be necessary. Chronic pancreatitis is usually seen in older patients after repeated attacks of acute pancreatitis, or during the progress of tuberculosis, syphilis, or hemochromatosis. Laboratory studies of the blood, especially determinations of pancreatic enzyme levels and glucose tolerance, are important in diagnosis. Chronic pancreatitis leads to diabetes, steatorrhea, and calcification, with the possibility of sudden fatal complications. Treatment is designed to eliminate, if possible, the cause of recurrences and to compensate, by means of insulin, pancreatin, and diet, for the loss of the internal and external secretions of the pancreas.

The purpose of this presentation is to discuss the medical aspects of pancreatitis. Descriptions will be given of precipitating or etiological factors, clinical manifestations, laboratory findings, diagnosis, complications, and treatment of the acute and chronic varieties of the disease.

Acute Disease—Etiology

Acute pancreatitis consists of an acute inflammation of the pancreas, the clinical manifestations of which vary with the severity of the inflammatory process as well as the extent to which the exocrine and endocrine functions of the gland are deranged. The three main varieties, edematous, hemorrhagic, and suppurative, probably represent different degrees of severity of the same process. The disease occurs in both sexes and in many instances appears to be precipitated by the ingestion of a meal, an overindulgence in alcohol, or an emotional storm. Although it is encountered most frequently in middle and late adult life, at least 40 cases have been reported in children.

All cases of acute pancreatitis do not have a common etiology. A variety of factors have been held responsible. They include obstruction of the ampulla of Vater with reflux of bile into the pancreatic duct—the "common channel theory"; obstruction of the pancreatic ducts; alcohol, ethyl and methyl; metabolic disturbances—hyperlipemia, diabetes mellitus, malnutrition, pregnancy, isoniazid administration,[1] and hyperparathyroidism[2]; trauma, due to accident, surgical manipulation, or electric shock; infection—specific infectious diseases, such as mumps and scarlet fever, as well as direct extension of inflammation from foci in the abdomen; vascular factors—obstruction of the pancreatic arterial system by atherosclerosis, essential polyangiitis, or injury from dye injected during translumbar aortography[3]; allergic factors; and neurogenic factors. Most of these have been recently reviewed in detail by Richman[4]; however, some of them will be discussed briefly in order to illustrate the varied mechanisms by which pancreatitis may develop.

Obstruction of the ampulla of Vater, a channel common to both pancreatic juice and bile, may be caused by a calculus, a plug of mucus or inflammatory debris, edema, a tumor, a parasitic worm, or spasm of the second portion of the duodenum as well as of the choledochopancreatic sphincter. The obstruction permits a reflux of bile into the pancreatic ducts, an essential feature of the "common channel" theory. However, acute pancreatitis has been encountered in the absence of an anatomically demonstrable common channel and ascribed to obstruction of the pancreatic ductal system alone as a result of a tumor, calculus, squamous metaplasia, inflammation and edema caused by a penetrating duodenal ulcer, inversion of the duodenal stump during gastric resection, or spasm of the duodenum or of the sphincter surrounding the opening of the pancreatic duct into the duodenum. In these cases the absence of an anatomically demonstrable common channel for bile and pancreatic juice has been used as evidence to eliminate the role of bile in activating the enzymes thought to be responsible for initiating the pancreatitis. Cholangiographic observations, however, suggest that reflux of bile into the pancreatic ducts can

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occur regardless of the type of anatomic arrangement of the terminal portions of the common bile and pancreatic ducts. Recently it has been postulated by Hosie and Ziffren [5] that the enzyme collagenase, present in activated pancreatic juice, may escape from the pancreatic ducts into the interstitial tissues of the pancreas and initiate a tissue reaction that transforms trypsinogen into trypsin, which in turn causes the inflammatory process.

The occurrence of attacks two to three hours after the ingestion of a heavy meal or an overindulgence in alcohol has led to the belief that these are important precipitating factors because of their ability to incite an increased secretion of pancreatic enzymes. Alcohol is thought to cause pancreatitis by causing an increased secretion of pancreatic juice against an obstruction due to spasm or edema of the papilla of Vater. The possibility of the existence in alcoholism of acute pancreatitis during the period of alcohol withdrawal after an alcoholic bout should be kept in mind. Sudden death in alcoholics due to acute pancreatitis has been reported by Dalgaard.

Acute pancreatitis has also been known to follow a direct blow to the abdomen, trauma incident to manipulation of a peptic ulcer adherent to the pancreas at laparotomy, biliary tract surgery, splenectomy, and right colectomy, as well as other operations in which the pancreas may be traumatized.

Acute Disease—Clinical Manifestations and Laboratory Findings

Clinical Manifestations.—The severity of an attack of acute pancreatitis depends on the nature of the pathological process present, i. e., edematous or hemorrhagic, as well as such complications as shock, hemorrhage, and sepsis. An attack commonly begins with a sudden pain in the epigastrium at any time of the day or at night during sleep. The pain is usually severe and constant; less often it is cramping and intermittent or dull and poorly defined. It is frequently more intense when the patient is lying supine than when he is sitting or lying on the side with his spine arched forward. Though usually originating in the epigastrium, the pain may also be experienced in other parts of the abdomen and may radiate to the back, substernal area, and flanks. Nausea and vomiting frequently occur soon after its onset. Constipation, as a result of reflex ileus, chemical peritonitis, or administered opiates, occurs more commonly than diarrhea.

A slight fever is usually present, and the pulse rate is increased, especially in the more severe cases. The blood pressure may be slightly elevated but is low in the more critical cases of patients with circulatory collapse, cyanosis, cold and clammy skin, rapid feeble pulse, and subnormal temperature.

The abdomen may be distended early as a result of ileus due to a chemical peritonitis, and peristalsis is diminished or inaudible. The administration of opiates may contribute to the ileus. Tenderness in the epigastrium is almost invariably present and is associated with rigidity. Tenderness may be elicited elsewhere in the abdomen, depending on the sites of seepage of the pancreatic juice.

A mild transient jaundice may be present as a result of associated cholangitis, obstruction of the ampulla of Vater, pressure on the common duct by an enlarged head of the pancreas, or hepatitis. Tetany due to hypocalcemia is occasionally encountered, particularly in the acute hemorrhagic form. Congestion, atelectasis, or a small pleural effusion may sometimes be detected at the base of the left lung. The latter has been ascribed to subdiaphragmatic irritation but has been found to contain significant amounts of amylase. Discoloration of the skin, varying from slate blue to mottled brownish yellow, due to ecchymosis (the color depending on the age of the extravasated blood) occasionally appears in the region of the loins (Gray-Turner sign) or of the umbilicus (Cullen's sign) at about the fifth to the seventh day of the disease. In the more severe cases of pancreatitis, a mass, often firm, fixed, and tender, may be palpable in the epigastrium or in one of the upper quadrants either early or subsequently in the course of the disease. This mass may consist of pseudocyst formation containing necrotic debris, blood, and fluid, of an abscess, or of inflamed mottled omentum studded with multiple fat necroses.

Laboratory Findings.—The leukocyte count is frequently elevated to 10,000 per cubic millimeter or more and, at times, to as high as 20,000 to 30,000 per cubic millimeter. Anemia is ordinarily absent. The concentration of serum amylase is usually increased to more than four to six times normal early in the attack, but no constant relationship exists between the elevation of the amylase level and the severity of the illness. It returns to normal within three to four days in uncomplicated cases. Persistent elevations indicate a continuation, extension, or progression of the process. The concentration of amylase in the peritoneal fluid obtained by abdominal paracentesis has been found to be increased and to remain elevated after the concentration in the blood has returned to normal. The appearance of the aspirated fluid may furnish some information as to the type of pancreatitis present, a yellow, turbid fluid indicating the edematous and a reddish brown color indicating the hemorrhagic form. The concentration of amylase in 24-hour collections of urine is frequently elevated and may remain elevated for longer periods than that in the serum after the acute attack has subsided. The concentration of serum lipase may be increased early in the attack and remain elevated

after the serum amylase level has returned to normal. Nardi and Lees [6] recently have found the serum trypsin level to be elevated in patients with acute pancreatitis; they believe this determination to be a more sensitive and reliable index than that of either serum amylase or serum lipase. An increased level of pancreatic desoxyribonuclease greater than five times the highest normal level has been reported in patients with hemorrhagic pancreatitis by Kowlessar and McEvoy.[7]

Other positive laboratory findings [8] may include hypocalcemia, hyperglycemia, hyperbilirubinemia, hypoprothrombinemia, positive findings on cephalin flocculation, thymol turbidity, and thymol flocculation tests, hyperlipemia, glycosuria, ketonuria, bilirubinuria, and an increased concentration of amylase in the urine.

Acute Disease—Diagnosis

The diagnosis of acute pancreatitis usually depends on the finding of a high serum amylase level in a patient with acute severe pain in the upper abdomen and tenderness, vomiting, fever, increased pulse rate, and leukocytosis.

Certain roentgenographic procedures may be helpful in the diagnosis. A survey film of the abdomen may reveal a "sentinel loop" of localized paralytic ileus, usually in the left mid-portion of the abdomen, calcification in the region of the pancreas, or the "colon cut-off" sign. The latter consists of an isolated gaseous distention of the ascending colon and hepatic flexure due to partial obstruction caused by spread of the inflammatory process from the head of the pancreas, as reported by Price in 1956. The barium meal study may disclose the "papillary sign," an unusual prominence of the papilla, as well as evidence of extrinsic pressure on the stomach, duodenal loop, or left half of the transverse colon. Occasionally, the diagnosis is difficult and, at times, impossible without resorting to laparotomy.

In the differential diagnosis, other causes of pain in the upper abdomen also require consideration. Perforated peptic ulcer is ordinarily associated with a greater degree of abdominal wall rigidity and can readily be differentiated by the demonstration of free air in the uppermost portions of the abdomen on a survey roentgenogram. Biliary colic is usually associated with tenderness in the region of the gallbladder. The patient, as a rule, does not appear as sick as does the one with acute pancreatitis. The pain of biliary colic does not last as long as that of pancreatitis, tends to spread and progress less, and may be in some cases temporarily relieved by nitroglycerin. Peritonitis due to causes other than a ruptured peptic ulcer is not usually preceded by the severe prostrating epigastric pain of acute pancreatitis. A moderately elevated serum amylase level in certain patients with peritonitis may be encountered and prove misleading if this criterion alone is used. Intestinal obstruction may be differentiated on auscultation by the high-pitched peristalsis occurring in regular periodic rushes (unless an opiate was recently administered) and on survey roentgenograms of the abdomen by the demonstration of gas-fluid levels. Occlusion of the mesenteric vessels, rupture of an aneurysm, and other causes of intra-abdominal pain may be differentiated, except under unusual circumstances, by normal serum amylase levels.

Coronary occlusion may be confusing, especially when pancreatitis is associated with shock. Acute pancreatitis has been reported to cause electrocardiographic changes [9] suggestive of myocardial infarction during the period of increased serum enzyme concentration. The changes include depression of the S-T segment, inversion of the T waves, and prolongation of the Q-T interval. They have been ascribed to a toxic substance in the blood stream arising from the pancreas, to coronary insufficiency secondary to shock and hypotension, and to the direct action of pancreatic enzymes on the structures of the heart. The electrocardiographic changes are not specific for acute pancreatitis but may be observed in a variety of conditions in which shock and electrolyte disturbances are present.

The finding of an elevated serum amylase level does not always mean that pancreatitis is responsible. The administration of opiates has been reported to be followed by a moderate elevation of serum amylase level, which may persist for as long as 24 hours. Usually the levels reached are not as high as those encountered in the early phase of acute pancreatitis. The serum amylase level may be elevated when renal function is impaired to a degree causing an elevation of blood urea nitrogen level. Sachar and Weinhaus, in 1956, reported an impaired renal clearance of pancreatic amylase which they thought was responsible for hyperamylasemia in a patient without obvious renal or pancreatic disease.

Acute Disease—Complications and Treatment

Complications.—The acute process may subside, or it may remain active until shock or sepsis terminates the picture. When death occurs within a few hours of the onset of the pain, it is usually the result of shock. The shock has been ascribed to a decreased blood volume occurring when the edema first appears.[10] When death occurs after three or more days have elapsed, it is usually the result of sepsis or severe internal hemorrhage. The peritonitis at first is chemical in nature, but, subsequently, secondary bacterial invaders appear, including gas-forming anaerobes, to cause a bacterial peritonitis, septicemia, septic thrombosis of the portal vein, or multiple abscesses. Shock may occur

as a result of excessive blood loss into the peritoneal cavity due to erosion of a sizable blood vessel. Other hemorrhagic manifestations that may develop include purpura, hematemesis, melena, and extravasation of blood into the mediastinum or abdominal wall. Obstruction of the jejunum or of the colon may occur as a result of involvement by an inflammatory mass about the body and tail of the pancreas.

Diabetic coma may complicate acute pancreatitis.[11] The distinguishing characteristics of the diabetic coma in patients with acute pancreatitis have been said to be a rapid fall in blood sugar levels in response to insulin, a water-resistant dehydration that responds to the expansion of the blood volume, brief periods of increased production of insulin or reduction of glucagon, severe degree of prostration, abdominal pain of pancreatic distribution, abdominal tenderness on palpation, sweating at some stage of the disease, elevated serum amylase levels, and failure to improve despite therapy.

Treatment.—In the past, many patients with acute pancreatitis were subjected to laparotomy because of the uncertainty of making an absolute diagnosis on purely clinical evidence. The mortality was high. During recent years increased confidence in the clinical diagnosis, resulting from more widespread use of the serum enzyme tests, has led to increasingly conservative management. Because of this and the improved methods of combating shock and sepsis in critically ill patients, the mortality from severe pancreatitis has decreased. Unfortunately, a certain number of patients have died when either medical or surgical therapy was used alone, indicating that the manner of treatment must be individualized and the plan of therapy chosen which offers the best prognosis. When operation is necessary it should be carried out at an appropriate time after the onset of acute symptoms and not during the early hours, unless suppuration, severe hemorrhage, or spreading peritonitis develops.

Conservative management includes bed rest and nothing given by mouth until the acute symptoms have subsided. Continuous gastric suction is maintained through a nasogastric tube in order to remove acid gastric juice, a natural stimulant to pancreatic secretion, and to reduce ileus. Atropine, 0.4 to 0.6 mg., is given by injection every three to four hours to suppress pancreatic as well as gastric acid secretion. Meperidine is preferred to morphine for pain because of the greater tendency of the latter to cause nausea and its demonstrated ability to cause spasm of the sphincter of Oddi with a resultant increase in pressure within the pancreatic ductal system. Tetraethylammonium (Etamon) chloride, 1 to 5 ml. of a 10% solution given intravenously every four hours, has controlled pain satisfactorily in some instances. At times, intractable pain has been promptly relieved by paravertebral, epidural, or splanchnic block.

Shock is combated by infusions of plasma, albumin, or blood. Parenterally given fluid, in the form of isotonic sodium chloride solution, is administered to overcome dehydration and to replace the chloride lost by vomiting and gastric aspiration. Potassium should be administered along with sodium to patients in whom large amounts of gastric content are aspirated because large amounts of potassium may be lost in this manner. Glucose solutions should not be given when a hyperglycemia exists, unless covering amounts of insulin (5 to 10 units of regular per 25 Gm. of glucose) are given. When insulin is used, great care must be exercised to avoid a fall in the blood sugar level to hypoglycemic levels. Calcium gluconate and vitamin K are injected parenterally when the serum calcium or plasma prothrombin levels are low. A broad-spectrum antibiotic may be administered in an attempt to prevent or suppress suppurative complications. Beneficial results from the use of cortisone have been reported in several instances. Dreiling and co-workers,[12] however, feel that the use of the steroids should be limited to patients with acute pancreatitis who have adrenocortical deficiencies, because of the experimental production of pathological damage to the acinar tissue of the pancreas that has followed the administration of these compounds, as well as because of postmortem evidence that similar changes occur in patients on steroid therapy. They found a depressant effect of steroids on the external secretion of the pancreas, which they ascribed to an interference with the proper functioning of acinar tissues.

The patient is permitted to take fluid and bland foods by mouth as soon as the acute symptoms subside. Thereafter, measures to eliminate such precipitating factors as cholelithiasis, alcoholism, peptic ulcer, or hyperparathyroidism should be instituted for prophylactic purposes. It should be pointed out that a cholecystogram may reveal a nonfunctioning gallbladder if performed too soon after an attack of pancreatitis. At least a month and sometimes longer should elapse before any significance need be attached to such a finding unless confirmatory evidence of cholelithiasis is obtained by biliary drainage. A glucose tolerance test should be performed on all patients to detect latent diabetes unless a diabetic state is obvious.

Chronic Disease—Etiology and Clinical Manifestations

Etiology.—Chronic pancreatitis is encountered most frequently during the fifth and sixth decades of life. It is usually caused by repeated attacks of acute pancreatitis. It may also occur as a result of involvement by tuberculosis, syphilis, or hemo-

chromatosis. The development of chronic pancreatitis in younger individuals on a hereditary basis has been reported by Comfort and associates. It is inherited through a non-sex-linked Mendelian dominant gene and is accompanied by a defect in amino acid metabolism, the distinctive feature of which is an excessive lysinuria.[13] It is not associated with gallstones, and alcoholism is not a factor.

Clinical Manifestations.—The clinical manifestations of chronic pancreatitis depend on the stage of the disease. During a relapse the manifestations are similar to those of acute pancreatitis. Subsequently, the clinical picture may be quite variable, depending on the degree to which the acinar and islet tissues are destroyed, the nature of the associated disease process, the presence or absence of calcification, and whether obstructive jaundice is produced. The clinical picture may also be modified by alcoholism and drug addiction, as well as the manifestations of hyperparathyroidism.

The chronic relapsing form is characterized by recurring attacks of acute and severe pain interspersed with variable intervals of relative freedom from symptoms. The painful episodes, associated with nausea, vomiting, constipation or diarrhea, fever, chills, tendency to tachycardia, and, sometimes, jaundice, may occur as infrequently as once in four years or as often as once daily or weekly; they have been known to last from less than one hour to 35 days. The pain is most frequently experienced in the epigastrium, then, in order of frequency, in the right upper quadrant, the left upper part of the abdomen, the right lower quadrant, and the periumbilical region. It may also be generalized. Radiation to the back is common. The pain, when typical, is severe and steady and tends to make the patient flex his spine forward for relief. The onset may be gradual or abrupt. Frequently, it gradually increases in severity, reaches a plateau, and then gradually declines. It may be temporarily relieved by opiates. Some patients have difficulty in describing the exact character of the pain but readily admit its marked severity.

Physical examination of the abdomen during an acute painful episode may reveal the signs of acute pancreatitis. In addition, an epigastric mass may be found, consisting of pancreas, enlarged because of inflammation or contained cysts, and, in some cases, hepatomegaly as a result of fatty infiltration. Early in the acute episode, the function of the acinar and islet cells is frequently disturbed. Eventually, the cellular disturbances become more permanent and cause steatorrhea and diabetes mellitus. Loss of weight, despite a good appetite and a satisfactory calorie intake, occurs as a result of faulty digestion and absorption of fat. The character of the stools changes, and their number increases when steatorrhea develops. The characteristic stool is bulky, frothy, glistening, pale in color, and foul-smelling. Sometimes, diabetes and/or steatorrhea first attract attention to the existence of a destructive inflammatory process in the pancreas.

Occasionally, the clinical picture is dominated by a progressive jaundice occurring as a result of compression of the common duct by the enlarged head of the pancreas. In such cases, the clinical diagnosis is usually that of carcinoma of the pancreas, and the true nature of the process is disclosed at laparotomy. In rare instances, obstruction of the colon thought to be due to a carcinoma is found to be the result of stenosis secondary to chronic pancreatitis. An instance of portal hypertension with hemorrhage from esophageal varices, secondary to recurrent pancreatitis, was reported by Snider and Nelson. They felt that the portal vein was probably compressed by the inflammatory process in the head and neck of the pancreas. The development of chronic pancreatitis without a history of acute painful episodes has been reported by Bartholomew and Comfort.

Chronic Disease—Diagnosis

Early in the course of the disease, the diagnosis is based on a history of recurring attacks of acute pancreatitis having the clinical and laboratory characteristics previously described. Subsequently, as the pancreas becomes progressively and extensively damaged, the functioning acinar cells may be too few to give an elevation of values for serum enzymes during the painful seizures and the diagnosis is based on the clinical picture, together with the laboratory findings, including hyperglycemia, glycosuria, a diabetic type of glucose tolerance curve, and a decreased volume and concentration of one or more of the pancreatic enzymes in the duodenal juice before and after the administration of a stimulant, such as secretin, bethanechol (Urecholine) chloride, or methacholine (Mecholyl). An increased amount of nitrogen and of total and unsplit fat may be detected in the feces while the patient is maintained on a diet containing fixed amounts of fat, protein, and carbohydrate. Evidence of impaired digestion and absorption of neutral fat may also be obtained by determining blood and stool concentrations of radioactive iodine (I^{131}) after feeding fat so labeled.

Roentgenographic demonstration of calcification in the region of the pancreas furnishes additional evidence of chronic pancreatitis. Such calcification, on the basis of relapsing pancreatitis, has been observed to become evident anywhere from 1 to 22 years after the onset of pain. The possibility of the existence of a parathyroid adenoma should be kept in mind in all cases of diffuse calcification of the pancreas. Other roentgenographic findings may include widening of the duodenal loop, compression or indentation of the duodenum, compression of the

antrum or posterior wall of the stomach, and anterior displacement of the stomach. Disturbances in the motor function and pattern of the small intestine may be detected. Their presence depends on the blood sugar level at the time of the examination, the presence or absence of hypoproteinemia, and abnormal serum potassium and calcium levels. A cholecystogram may reveal a normally functioning or a nonfunctioning gallbladder, with or without evidence of calculi.

In the differential diagnosis of the acute painful episodes of chronic relapsing pancreatitis, the same causes of abdominal pain as were discussed in the section on acute pancreatitis are to be kept in mind. In the differential diagnosis of chronic pancreatitis associated with steatorrhea, sprue must be considered. Sprue is characterized by relapses and remissions of symptoms, consisting of anorexia, flatulence, loss of weight, passage of foul-smelling flatus and bulky stools, a flat oral glucose tolerance curve, and a lack of the laboratory abnormalities characteristic of a damaged pancreas. Intestinal lipodystrophy (Whipple's disease) may also be associated with steatorrhea as a result of deposits of fat and fatty acids in the intestinal and mesenteric lymphatic tissues. Associated clinical manifestations of intestinal lipodystrophy may include flatulence, arthritis, loss of weight, anemia, edema, ascites, cutaneous pigmentation, and evidence of a low-grade inflammatory involvement of the peritoneal, pleural, and pericardial cavities.

When obstructive jaundice is present, a differential diagnosis between chronic pancreatitis and carcinoma of the pancreas is not possible on the basis of the fat content of the stools, the glucose tolerance curve, the concentration of pancreatic enzymes in aspirated duodenal juice, or the roentgenographic demonstration of obstruction or distortion of the duodenum or stomach. The finding of malignant cells in aspirated duodenal juice or the demonstration of metastases supports a diagnosis of carcinoma. Carcinoma is more likely to be associated with anorexia, cachexia, and pain, which is usually less acutely severe but more persistent. It is intensified when the patient is lying in the supine position and relieved by forward flexion of the spine as in the fetal or knee-chest positions. Occasionally, at laparotomy, a biopsy of the pancreas will reveal extensive fibrosis and chronic inflammation secondary to an undetected carcinoma of the pancreas. The inflammatory reaction is secondary to the malignancy. Bartholomew and associates have noted the development of carcinoma of the pancreas in patients with long-standing pancreatitis associated with calcification. In Senior's [14] series of 96 patients collected at the University Hospital and thought to have chronic pancreatitis, 12 eventually were discovered to have carcinoma of the pancreas. Exploration and biopsy of the pancreas had been done in some of the 12, the biopsy disclosing only evidence of chronic pancreatitis.

The problem is a difficult one, and differentiation is not always possible clinically, grossly at laparotomy, or even on biopsy. Some patients with chronic relapsing pancreatitis have had their symptoms ascribed to psychoneurosis. One must always bear in mind that the clinical picture may be confused by alcoholism or drug addiction.

Chronic Disease—Course, Prognosis, and Treatment

Course and Prognosis.—The course of chronic relapsing pancreatitis depends to a large extent on the maintenance and persistence of the etiological factors and on the degree to which the pancreas is damaged. Eventually, the state of chronic pancreatitis is reached, with varying degrees of pancreatic insufficiency as manifested by diabetes, steatorrhea, and calcification. Death may occur at any time from intercurrent infection, pancreatic necrosis, peritonitis, abscess, septicemia, pyelophlebitis, complications of diabetes, intra-abdominal bleeding, or gastrointestinal hemorrhage from peptic ulcer or gastroduodenitis.

Medical management in the presence of severe pain is unsatisfactory and is often complicated by drug addiction and alcoholism. A variety of surgical procedures has been employed, with results sometimes satisfactory but often as unpredictable as those of medical therapy.

Treatment.—Chronic relapsing pancreatitis may be treated medically, surgically, or by a combination of these methods.

Medical treatment is purely palliative and consists of relief of pain, substitution therapy in patients with pancreatic insufficiency, and eradication of etiological factors of a nonsurgical nature. The treatment of the painful attack is similar to that of acute pancreatitis. In the intervals between attacks, and especially when pancreatic insufficiency develops, the diet should be high in carbohydrate and readily assimilable protein but low in fat. If gastric hyperacidity exists, gastric secretory depressant drugs should be administered in an attempt to prevent peptic ulceration of the duodenum, to which such patients are predisposed when the amount of bicarbonate eliminated by the diseased pancreas becomes decreased. The administration of predigested protein in supplemental feedings may aid in maintaining a positive nitrogen balance. An active form of pancreatin is administered in sufficient amounts (up to 3 Gm. with each meal) to decrease steatorrhea and azotorrhea as well as a multivitamin capsule daily to insure an adequate intake of the essential vitamins. Bile salt preparations may be administered to increase the absorption of fat-soluble vitamins, especially in patients with jaundice, as in these the bile salt concentration

may be decreased. Choline or methionine are indicated for those patients whose protein intake is inadequate in an attempt to prevent subsequent development of a fatty liver and possible cirrhosis. Diabetes should be controlled with insulin. The use of alcoholic beverages should be discontinued by those in whom alcoholism appears to be the major precipitating factor. Gastroduodenal disease, when present, should be properly treated.

Jaundice due to obstruction of the common bile duct by an enlarged head of the pancreas requires a surgical procedure, such as a cholecystenterostomy. Cholelithiasis and choledocholithiasis should be treated surgically in an attempt to relieve those patients in whom biliary tract disease may be the predisposing factor. For repeated attacks of severe pain, not controlled by conservative measures, a variety of surgical procedures has been employed.

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PROGRAM ON MEDICAL ASPECTS OF AUTOMOBILE INJURIES AND DEATHS

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The American Medical Association, appalled by the rising tide of deaths and injuries occasioned by the automobile and realizing that a certain undetermined percentage were due to physiological conditions, pathological states, emotional disturbances, or drugs and alcohol, appointed a committee, through its Board of Trustees, to study and report on the medical aspects of automobile crash injuries and deaths in 1955. This committee was to determine the magnitude of the problem, study the epidemiology and methods of prevention and cure primarily from a purely medical standpoint, and determine the role of the physician in obtaining these objectives.

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Read in the Session on Traffic Accidents before the Section on Miscellaneous Topics at the 107th Annual Meeting of the American Medical Association, San Francisco, June 25, 1958.

The first endeavor of the committee was to acquaint the medical profession with these broad aspects by presenting a symposium at the 1956 meeting in Chicago. At the same time a rather comprehensive scientific exhibit was also presented. This effort was well received and many requests for reprints were received from both American and foreign physicians. A 15-minute movie called "On Impact" was also prepared in collaboration with the Ford Motor Company. This film depicted some of our efforts toward curbing this rising tide of injuries.

The committee decided that its first duty was to prepare three pamphlets. The first one has been written at the popular level in lay language to serve as a guide to the patient in answer to the query "Are you fit to drive?" The first 100,000 copies were paid for by the Association of Casualty and

Surety Companies of New York. The Center for Safety Education of New York University collaborated in this venture.

The second pamphlet is designed to serve as a guide to the physician in determining a patient's fitness to drive. This is a pioneer work; it has been completed and will be published in a future issue of THE JOURNAL. The material will be presented under such sections as cardiovascular and ophthalmological aspects. The third and most comprehensive pamphlet will be written as a guide to examining police officers and state traffic agencies and will set certain physical standards. We have also suggested that each state medical society appoint a traffic safety committee to work with various state agencies.

Our studies over the past two years have shown that there are many divergent medical interests in many phases of this problem. For instance, we are working through the National Safety Council in establishing uniform and reasonable speed limits. We are collaborating with the American College of Surgeons for safer automobile design. We are working through the Roberts' Congressional Committee to this same end and to assist in providing new and needed legislation. We have given our conclusions in regard to alcohol blood levels to the legal division of the A. M. A. and to the Committee on Alcohol. Finally, we hope to establish a set of uniform objectives that will guide us and the various state and local safety committees.

400 Locust Ave.

MEDICAL GUIDE FOR PHYSICIANS IN DETERMINING FITNESS TO DRIVE A MOTOR VEHICLE

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and
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Traffic accidents killed about 40,000 individuals last year and injured about 1,500,000. This constitutes one of the nation's largest unsolved health hazards. Physicians have not realized or accepted their responsibilities in this health problem as they have with heart disease, cancer, and other disease entities.

Since the human factor is the most important single factor responsible for motor vehicle accidents, the physician must initiate and participate in research designed to determine the relationship between physical and emotional factors and the etiology of accidents. He is the only person able to ascertain the physical, mental, emotional, or physiological impairments of an individual and to evaluate these disabilities in relation to safe driving ability. It is the responsibility of the physician to persuade a patient to discontinue driving when he no longer is able to drive with safety.

Motor vehicle drivers may be classified as two general types: civilian or private drivers and commercial or industrial drivers. The latter group includes transportation drivers. The required physical and mental standards for commercial vehicle drivers, especially transportation drivers, should be more rigid than for civilian drivers. The civilian driver should be examined every three years up to the age of 45 years and every two years thereafter. The commercial vehicle driver should have a preplacement examination and a periodic examination every two years up to the age of 45 years and annually thereafter.

A patient may incur temporary or permanent disability which should prevent him from driving. He may be suffering with an illness that directly or indirectly interferes with his driving ability, making it unsafe for him to drive until the condition is controlled. For example, everyone agrees that a diabetic who takes insulin and is subject to hypoglycemic reactions should not drive, nor should a patient with uncontrolled convulsions or a cardiac condition that might cause sudden loss of consciousness.

The Committee on Medical Aspects of Automobile Injuries and Deaths has prepared a medical guide for physicians in determining fitness to drive a motor vehicle which will be useful in advising patients on their fitness to drive. The guide will be published in a future issue of THE JOURNAL.

Read in the Session on Traffic Accidents before the Section on Miscellaneous Topics at the 107th Annual Meeting of the American Medical Association, San Francisco, June 25, 1958.

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ROLE OF PRIVATE PHYSICIAN IN MOTOR VEHICLE ACCIDENT PREVENTION

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The physician can help in at least five ways to reduce the damage done to human lives by motor vehicle accidents. He can "teach while treating" by explaining the relation of defects and diseases to accidents. He can and should make sure that community emergency services are improved. He can make sure that emergency rooms in hospitals are organized in such a way that a sudden influx of accident victims will not create chaos. He can influence the development of sound medical standards for driver licensing. He can engage in research on the causes and prevention of accidents. The fact that more than 4 million persons require physicians' services because of motor vehicle accidents represents at once a responsibility and an opportunity in the field of preventive medicine.

The practicing physician has long been concerned with the problems generated by motor vehicle accidents, primarily, the provision of medical services to the injured. The true magnitude of his task has only come to light in the past year. The recent report of the National Health Survey indicates that 2,500,000 persons were injured in motor vehicle accidents from July 1 to Dec. 31, 1957. Approximately 85% of those injured required medical attention. This means that each year over 4 million persons require physicians' services because of motor vehicle accidents.

It is, therefore, not surprising that physicians are now looking beyond the immediate task of restoring accident victims and asking that more resources be devoted to the prevention of accidents and resultant injuries. Individually and collectively, physicians have expressed their concern with the injury-producing potential of the automobile. Through the American Medical Association and other medical organizations, this concern has been voiced by asking that more attention be given to the design of vehicles which will minimize the danger of injury, should an accident occur.

Through improvements in clinical knowledge, methods, and skill, physicians have helped to hold the total number of fatalities at a rather fixed level. No precise measure of this contribution can be made, but it is known that fatalities have remained constant in spite of a tremendous increase over the past 20 years in the total miles traveled annually.

Two years ago the Committee on Medical Aspects of Automobile Injuries and Deaths, of the American Medical Association, was organized in order to utilize more effectively the interests and resources of the medical profession towards the solution of this complex problem. As indicated by its name, the committee has restricted its efforts to a particular segment of the problem. The committee recognizes that, to be successful, physicians must not dissipate their interests and energies by going into aspects of the problem in which they are not competent. The physicians must examine their capabilities and accept responsibility for suitable activities.

The following activities are proposed as meeting the above criteria. If implemented by every physician, they would result in significant decreases in deaths, injuries, and disabilities. First, there are the many things that can be done as a physician, working with patients. The traditional physician-patient relationship provides the ideal situation for patient guidance in accident prevention.

One thinks immediately of the obvious opportunity which occurs when the physician is actually treating an injury and can "teach while treating," by explaining accident causation and warning against potential future hazards. I use the term "ideal" because no learning situation could be better calculated to produce attention and acceptance on the part of the patient.

Beyond this special situation, however, additional guidance possibilities are almost limitless. When the physician, in the course of his normal practice, discusses with patients conditions or disabilities that could interfere with the ability to drive a motor car, there should be frank counseling on this subject, and the hazards of driving should be plainly indicated. Possible relationship of side-effects of medication on driving ability should be stressed.

In addition, inadequate vision and hearing, diabetes, epilepsy, and heart and neuromuscular conditions (to name but a few) can create serious driving hazards. The physician's advice in this connection will carry weight with the patient, while the latter may not otherwise give proper emphasis to the relationship between his condition and his driving capacity.

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Read in the Session on Traffic Accidents before the Section on Miscellaneous Topics at the 107th Annual Meeting of the American Medical Association, San Francisco, June 25, 1958.

Emergency Services

The second major responsibility of the medical profession is to improve community emergency services. The care and transport of the injured is a matter that has not received the attention it deserves. Studies made during World War II and the Korean war demonstrated the great values of properly administered first aid and careful handling during transport to the medical facility. Implicit in good community emergency services, whether provided by public or private organizations, are the following standards: (1) trained drivers and attendants for all ambulances, (2) continued supervision of emergency services, and (3) adequacy of equipment.

There are several ways of achieving these objectives. In some areas full-time rescue squads are in existence. The physician, through his local medical society, can provide the training that is indicated. Where a community relies on private services it has proved feasible, in some areas, to require training of drivers and attendants as a prerequisite to licensing. In some communities the local health department is the licensing and supervisory agency. But in each instance the best interest of the patient is served when the physicians of the community are active in the training and continued supervision of the services.

Third, and equally important in any community, is the status of the hospital emergency services. A direct contribution can be made here if physicians will exert themselves to improve and coordinate the services in hospital emergency rooms. The team approach is all important in rendering these services, which have so great an influence on minimizing the effects of accidental injury, and much remains to be done to raise the standards of hospital emergency rooms throughout the country.

Specifically, the emergency rooms should be organized in such a way that a sudden influx of accident victims will not create chaos. This means better planning and supervision on the part of the attending staff. This important phase of patient care cannot be delegated to the intern and resident staff. Ancillary services, such as x-ray and laboratory, should be available either immediately or within a few minutes, and the equipment must be adequate.

These three activities, patient guidance, improvement in community emergency services, and improvements in hospital care, require the support and participation of physicians individually and at the community level.

Other Contributions by Physicians

Working through the State Medical Society, the practicing physician can make a fourth major contribution. I refer to the development of sound medical standards for driver licensing. This can be achieved by providing the motor vehicle administrator with a technically competent advisory group. This advisory group can also provide guidance to the motor vehicle administrator in the handling of problem cases. In some states the Medical Society and the State Health Department have worked jointly with the licensing authority to establish special procedures for the supervision of drivers thought to represent added risks, e. g., epileptic.

The importance of a physician's role in research hardly needs emphasis. Through such cooperative endeavors as the Cornell Automotive Crash Injury Research Project, he has made a significant contribution. It is not unreasonable to expect an increased interest in accident prevention research. By virtue of his access to the clinical data and his training, the physician is particularly well qualified to carry out such investigations.

Thus the physician, as a physician, can make five contributions: (1) give individual patient guidance, (2) improve community emergency services, (3) improve hospital emergency services, (4) develop medical standards for drivers' licensing, and (5) engage in auto accident research.

In addition, as a leading member of the community, the physician can make a significant contribution to accident prevention by lending his support to every worthwhile local effort to cut the accident rate. For example, driver education, organized at the high school level, has demonstrably improved teenage driving habits, and equally gratifying results can be anticipated from adult driver education. The encouragement and development of adequate driver training programs in a community require organized community effort; physicians, acting either individually or as medical society members, can exert leadership in this important area. The physician's word will also carry weight in any community when he supports movements for improved enforcement of traffic laws.

Public health officials throughout the United States are laying special emphasis on better first-aid training. Here the physician is the indispensable person. The physician can help by emphasizing the need for first-aid training and its benefits, and by counseling the instructors. Although my topic has been the physician's role in accident prevention, the cooperative relationship between the private physician and the public health profession in this vital field of activity should also be mentioned. The stimulation and guidance of community action to reduce the terrific toll of death and disability from accidents in this country is an important responsibility of the State and local health departments, aided by the Public Health Service.

Through professional education and education of the general public, it is hoped that a significant contribution to accident prevention can be made in the years ahead. Local education campaigns of this nature can succeed only with the enthusiastic support of appropriate local groups, and no community group is a more necessary partner in this undertaking than the private physicians.

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PSYCHOLOGICAL AND PSYCHOPHYSIOLOGICAL FACTORS IN MOTOR VEHICLE ACCIDENTS

FOLLOW-UP STUDY

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A continued and more intensive investigation of the personal factors that might make some drivers more susceptible than others to automobile accidents was carried out in 20 airmen. Ten had been held officially responsible for two or more accidents in the preceding four and one-half years. They were compared with 10 who had no record of accidents in the same period. The tests included a structured psychiatric interview and a routine psychological examination as well as other functional tests. No differences were found between the two groups in either intelligence or psychophysiological responsivity. However, in the area of personality functioning, accident-repeaters displayed significantly poorer control of hostility, lower tension-tolerance, higher separation anxiety and dependency needs, and extremes both of egocentricity or sociocentricity and fantasy-preoccupation or unreflectiveness.

It has long been recognized that motor vehicle accidents are not, as the term implies, simply a function of what "erring men call chance." It has been demonstrated, for example, that some roads are safer than others and that certain times of the day are safer. There is also some evidence to indicate that certain people are more likely to have accidents than others, and a number of attempts have been made to determine whether such persons possess unique personal characteristics which differentiate them from their fellowmen who do not have accidents.

For example, in various studies the accident-repeater and nonaccident drivers have been compared on a wide variety of psychophysical and psychophysiological measures, on measures of personality structure and functioning, and on social history variables. Many of these studies have yielded equivocal or contradictory results, probably partly because of real differences between the populations studied, but probably also in many cases because of methodological deficiencies in the design of the studies—including failure to control for variations in accident exposure, unreliability in the accident criteria employed, and lack of objectivity in the measurement of driver characteristics.

The weight of the evidence, however, suggests that in most populations accident repeaters are likely to differ from other drivers in their personal characteristics and, further, that psychological variables are more likely to prove discriminating than measures of physiological or psychophysical functioning.[1]

The purpose of the present paper is to describe the most recent findings in a four-year investigation of the role of personal and interpersonal factors in determining accident frequency and severity among airmen stationed at Lowry Air Force Base in Denver. In previous work on this project, 264 subjects were administered a wide variety of psychiatric and psychological techniques, including structured psychiatric interviews, objective and projective personality tests, attitude and interest tests, and a number of psychophysical measures.

From the University of Colorado School of Medicine.

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As reported previously,[2] most of these measures failed to discriminate consistently with repeated samples between high-accident, middle-accident, and nonaccident rate airmen. For example, while a number of psychophysical measures, such as discrimination reaction time and depth perception, and a number of objective personality tests, such as the Minnesota multiphasic personality inventory and the Thurstone temperament scale, appeared promising initially, they failed to survive in cross-validation. One type of measure, however, proved extremely stable, namely, measures of the individual's value system.

Of the six scales contained in a modification of the Allport-Vernon-Lindzey study of values, developed by Dr. Jerome Levy of the project staff, three scales—those dealing with esthetic, theoretical, and religious concerns—proved highly discriminating, both initially and in later cross-validation samples. The remaining scales (economic, political, and social) did not. The accident subjects were consistently less oriented toward religious values, and

more toward esthetic and theoretical values than the nonaccident subjects. As might be expected, the mean scores of the middle-accident subjects fell in the middle range between the high-accident and nonaccident subjects.

On the basis of the scores on this test, it was possible to differentiate successfully between high-accident and nonaccident subjects in approximately 73% of cases in repeated samples over several years. While this degree of predictive success was encouraging, the authors felt that not enough was yet known of the personality structure and functioning of these subjects to interpret the psychological meaning of these test findings with confidence.

The primary aim of the present study, therefore, was to obtain a broader understanding of the characteristics of these two groups. The subjects were 10 high-accident and 10 nonaccident rate airmen, selected to be representative of the over-all accident and nonaccident populations. Each of these subjects was studied intensively. High-accident subjects were defined, as in the previous study, as individuals who had two or more accidents for which they were officially held responsible in the past four and one-half years, at least one of which occurred within the year immediately preceding testing. Nonaccident subjects were defined as individuals who had no record of accidents, according to either official records or the individual's subjective report, during the past four and one-half years. Data obtained fell into two general categories: clinical studies and objective testing.

Clinical Studies

The major portion of the present study involved an intensive clinical evaluation of 10 high-accident and 10 nonaccident rate subjects. Each subject received a structured psychiatric interview aimed at obtaining information regarding his social history and personality development as well as his current attitudes, interests, behavior, and personality functioning. This interview was tape-recorded for future reference.

In addition, each subject received a routine psychological examination by one of the clinical psychologists on the staff of the University of Colorado Medical School. The following battery was administered at one sitting: the thematic apperception test (10 cards), the Rorschach test, the Wechsler-Bellevue intelligence scale (four subtests), and the Sacks sentence completion test. In each case, the psychologist was asked to prepare a general evaluation of the subject, noting such things as over-all assets and liabilities, basic character traits, and defense mechanisms employed. In view of the intention of the investigators to avoid as much as possible influencing the specific content of the reports, no further instructions were given.

The interviews were conducted by two project members, a psychiatrist and a psychologist; the psychological testing was done by five clinical psychologists. Assignment of interviewers and testers to subjects was done randomly, and in neither case did the examiner have any knowledge of the subject's accident status.

Thus, the basic data employed in this phase of the study consisted of (1) psychiatric interview transcripts and (2) test protocols and individual psychological reports. These data were then rated independently for 13 variables hypothesized to be significantly related to accident frequency and severity on the basis of previous work. In addition, two over-all personality-type descriptions were presented, one hypothesized to represent a composite accident individual and the other a composite nonaccident individual. Raters were asked to rate subjects as more like one or the other of these two personality types.

In the case of the interview, two judges were employed—the original interviewer and the alternate interviewer. Similarly, in the case of the psychological reports and original test protocols (which were rated as a composite unit), two judges were also employed—the original tester and one of the other testers. Preliminary analysis showed a high degree of agreement between raters. In view of this evidence of reliability, the average rating of the judges was employed in all cases. The 13 variables rated by the judges included the following criteria.

Variables

1. Amount of Underlying Hostility.—Ratings of hostility (whether expressed or not, and regardless of how expressed) were made along a continuum from negligible to excessive. This variable was included because it has frequently been mentioned in the literature as distinguishing accident from nonaccident subjects. It was the investigators' opinion, however, that this variable was not directly related to accident susceptibility. Rather, it was felt that the importance of underlying hostility as a factor in accident susceptibility could be evaluated only in relation to the individual's capacity for control. This hypothesis led to inclusion of the next two variables.

2. Strength of Destructive, Hostile Impulses Directed Toward Environment in Relation to Ability to Control These Impulses.—Possible ratings of hostile impulses to environment ranged all the way from "hostility moderately or much greater than control" to "excessively greater control in relation to amount of hostility." It was predicted that accident subjects would show relatively less capacity for control in relation to strength of hostility.

3. Aggression and Behavior.—Raters of aggression and behavior were asked to judge which of the following descriptions most nearly character-

ized the subject: (*a*) Consistently, openly belligerent; (*b*) usually controlled but occasional outbursts of belligerence; (*c*) covertly hostile (passive-aggressive, critical, carping, indirectly aggressive toward others); (*d*) realistic, flexible, appropriately assertive; (*e*) passive, unassertive (fear of retaliation for expression of aggression); (*f*) unassertive, low drive, low energy; (*g*) depressed; and (*h*) other, to be briefly described. It was predicted that accident subjects would be more likely to fall in categories *a* through *c*, nonaccident subjects into categories *d* through *g* (only one subject fell in category *h*, about which there was no prediction).

4. Reality Orientation.—Possible ratings of reality orientation (realistic appraisal of own motives and environmental forces affecting subject—extent to which behavior is directed toward meeting subject's own enlightened self-interest) ranged from very poor (definite breakdown, at least occasionally in reality-testing) to excellent. It was predicted that nonaccident subjects as a group would tend to show more adequate reality orientation.

5. Egocentric Versus Sociocentric.—Ratings ranged from very egocentric (very self-centered, little interest in rights of others or respect for their feelings) through a neutral mid-point (neither markedly egocentric nor sociocentric, fairly good balance between satisfying own needs and respect for needs and feelings of others) to very sociocentric ("overdetermined" awareness of, interest in, and respect for rights and feelings of others). It was predicted that accident subjects would be more likely to cluster at the extremes of the continuum, with nonaccident subjects tending to fall around the midpoint.

6. Conventionality.—Conventionality ratings were based on the extent to which the individual was conventional in his conscious thinking, values, interests, and impulses to action, as possibly distinguished from, for example, underlying unconscious needs, or overt behavior in certain life situations. Degree of conventionality or unconventionality should not be confused with degree of over-all adjustment, which was rated separately. Possible ratings ranged from highly conventional to highly unconventional. It was predicted that accident subjects would be rated as less conventional than nonaccident subjects.

7. Over-all Adjustment.—The degree of over-all adjustment—ability to live happily and function effectively—was rated by satisfactory resolution of subject's needs in relation to environmental and superego demands. This should be separate from conventionality or unconventionality of this adjustment. Possible ratings ranged from definitely disturbed to excellent adjustment. It was predicted that accident subjects as a group would tend to have a somewhat poorer adjustment than nonaccident subjects.

8. Castration Anxiety.—Possible ratings of specific evidence of castration anxiety, or generalized fear of injury to self, ranged from high to low, with a separate category entitled "Not clearly observable in these data." This variable was included largely because it appeared prominent in many of the psychological test reports. It was predicted, though without too much confidence, that nonaccident subjects would score higher on castration anxiety than accident subjects, the rationale being that high castration anxiety might make the subject more conscious of risk and less willing to engage in risk-taking behavior.

9. Separation Anxiety.—Possible ratings for separation anxiety (fear of loss of love and support, concern with oral supplies) ranged from high to low, with a separate category entitled "Not clearly observable in these data." As in the case of castration anxiety, this variable was included largely because it appeared prominently in many of the psychological test reports. It was predicted, again without too much confidence, that accident subjects would score higher on separation anxiety than nonaccident subjects, the rationale being that underlying feelings of lack of love lead to resentment which might tend to be acted out against figures perceived as depriving.

10. Extent of Fantasy Preoccupation.—Possible ratings ranged from excessive preoccupation with fantasy satisfactions through a mid-point of "effective integration of fantasy and action, planfulness" to extremely "stimulus-bound" (likely to act directly in response to people or objects with little fantasy or reflection). It was predicted that accident subjects would tend to cluster at the extremes, while nonaccident subjects would tend to fall around the midpoint.

11. Character Type.—Raters were asked to judge which of a number of character types most nearly described the subject (if more than one category was used, probable priority was indicated by using numbers 1, 2, etc.—see table 2). While it was not felt that this variable was likely to prove discriminating, it was included because of the attention it has received in the literature.

12. Ability to Tolerate Various Tensions.—Possible ratings of tolerance to tensions (i. e. without discharging them immediately) ranged from high to low, with a separate category entitled "Not clearly observable in these data." It was predicted that high-accident subjects would reveal a lower capacity for tension tolerance.

13. Friendship Patterns.—Finally, raters were asked to judge which of the following categories, in their opinion, most nearly described the status of the subject's social relationships: (*a*) no close friends, few casual friends; (*b*) some close friends, few casual friends; (*c*) some close friends, many casual friends; (*d*) no close friends, many casual friends. It

was predicted that nonaccident subjects would be more likely to fall into categories *b* or *c*, with accident subjects falling primarily in categories *a* or *d*.

Composite Individuals

In addition to the above variables, raters were presented with the following two personality-type descriptions, intended to characterize hypothetical composite nonaccident (type x) and accident (type y) subjects, and were asked to state which of the two types the subject most nearly resembled.

Type X.—The type x sort of person tends to be rather conventional in his values, attitudes, and behavior. In general, he seems to gain satisfaction for his needs from his everyday life and to have a fairly clear notion of the goals he wants to attain in life and of how to pursue them. He tends generally to have respect for the rights and opinions of other people, and in turn to be pretty well accepted by others. While he may be normally assertive in defending his own rights, he is seldom extremely demanding, domineering, or combative. In some cases, he may actually be somewhat less assertive than an adequate defense of his own rights would require. Such underlying hostility as he may have tends to be pretty well controlled and is seldom expressed in an obvious "acting-out" fashion. If psychopathology is present in this type, it is most likely to take the forms of denial, overly strong needs for conformity, castration anxiety and fear of aggression from others, and overly strong needs to please or placate others.

TABLE 1.—*Ratings of Clinical Psychological Reports for Accident-Repeater and Nonaccident Groups*

Variable, No.	Direction		Level of Significance (If Below 0.10)
	Accident	Non-accident	
2 Hostility/control ratio	Less control	More control	0.02
3 Aggression and behavior	Aggressive	Adaptive, unassertive	0.05
5 Egocentric—balanced—sociocentric	Extremes	Balanced	0.01
9 Separation anxiety	High	Low	0.01
10 Fantasy—integration—stimulus-bound	Extremes	Integration	0.10
12 Tension tolerance	Low	High	0.01*
14 General personality	Type Y	Type X	0.10

* From psychiatric interview; all others from psychological reports.

Type Y.—While there may be a fair amount of individual variation on specific characteristics, in general the type y person tends to be rather unconventional in his opinions and values and sometimes in his overt behavior. He is inclined to be rather self-oriented, to have difficulty in relating easily and warmly to other people, and to be somewhat unaware of, or insensitive to their rights and feelings. He may in some cases feel that other people are difficult to understand. He often has feelings of dissatisfaction about his everyday life and is likely not to have clearly defined goals in life or consistent, practical methods for attaining such goals as he does have. He is apt to have difficulty in controlling his hostility, which may often be excessive, and consequently may at times be inclined toward overdetermined "acting-out" behavior, either at the level of overt physical belligerence or at the level of verbal aggression—in the form of sarcasm, carping complaints, or destructive comments. He is likely at times to exercise poor judgment in his evaluation of his environment or in choosing courses of action. In some cases, he may appear overly preoccupied with his own fantasy world and relatively cut-off from social relationships with others. If psychopathology exists in this type of individual, it appears most likely to take the forms of impulsive, hostilely-toned, acting-out behavior, poor reality testing, emotional lability, impaired intellectual functioning, a highly personalized, idiosyncratic fantasy, withdrawal from interpersonal relationships, or excessive immaturity.

Results

As may be seen from table 1, 6 of the 13 variables proved discriminating between high-accident and nonaccident subjects at the 0.10 level of confidence or better and 4 proved significant below the 0.02 level (i. e. less than 2 chances in 100 that differences this large or larger could have occurred by chance). Of the 11 variables hypothesized as possibly discriminating, 6 showed significant differences in the predicted direction, either in the psychological test battery, the psychiatric interview, or both.

In comparison with nonaccident subjects, the accident subjects showed a statistically significant tendency (1) to have less capacity for managing or controlling hostility; (2) to be either excessively self-centered and indifferent to the rights of others or excessively sociocentric (i. e. characterized by an "overdetermined" awareness of, interest in, and respect for the rights and feelings of others); (3) to be either excessively preoccupied with fantasy satisfactions or extremely "stimulus-bound"; (4) to be more fearful of loss of love and support (and, by inference, more angry and resentful toward persons viewed as depriving); and (5) to be generally less able to tolerate tension without discharging it immediately. In addition, the accident subjects tended to be categorized more frequently as consistently or occasionally belligerent or covertly hostile, and less frequently as only appropriately assertive, or unassertive. While not statistically significant, there were tendencies for the accident subjects to be rated as more conventional and generally better adjusted. There were no differences between accident and nonaccident subjects in ratings of reality orientation, castration anxiety, or friendship patterns.

Of the two variables hypothesized not to be discriminating, neither showed significant differences. Neither hostility alone, without reference to

capacity for control, nor clinical character type showed any clear-cut trends. The distribution of accident and nonaccident subjects among the various character types is shown in table 2. Only subjects on whom both psychological test raters independently agreed are included in this comparison. Agreement was shown in 18 cases and disagreement in 2 cases. As may be seen, both accident and nonaccident subjects are distributed across a large number of categories, and there is little tendency for either accident or nonaccident subjects to concentrate in any particular category or categories. While the number of subjects in this study is too small to refute the hypothesis that certain clinical character types are more frequent among accident than nonaccident subjects, it seems clear that no single category could account for a majority of either accident or nonaccident subjects.

It will be noted that the predictive success of the clinical testing was considerably greater than that of the psychiatric interviews. While this fact may well reflect real differences in the predictive potential of the two measures, it should be pointed out that electronic recording difficulties resulted in incompleteness in a number of the interview transcripts, and this may well have lowered the predictive value of this measure.

It should also be observed that the present findings have not been cross-validated on other samples of subjects. This should certainly be done before the present results can be accepted without reservation. It may be that one or more of these findings will eventually prove to be the result of chance. However, it appears extremely unlikely that cross-validation will fail to support the main body of the findings, since it is extremely unlikely that significant differences would be obtained in 6 out of 11 cases by chance, especially with relatively small sample sizes.

The ratings of the two over-all personality-type descriptions resulted in correct discrimination of both accident and nonaccident subjects in 70% of the cases. Despite the small number of subjects, such a result would be expected by chance less than 10 times in 100. Thus, while a number of the specific variables rated had somewhat greater predictive value, in general it would appear that these personality-type descriptions provide a fairly adequate picture of the hypothetical composite accident and nonaccident individuals.

Objective Testing

In addition to the clinical studies described above, all subjects were administered a number of objective measures of interest, intelligence, psychophysical skills, and psychophysiological functioning. (Several of these measures, such as the Wechsler-Bellevue intelligence scale, were actually administered as part of the clinical studies, and analyzed clinically at that time, but the results of formal scoring will be considered here simply for expositional convenience.) Each of these measures will be discussed briefly, together with the results obtained.

The modified Allport-Vernon-Lindzey study of values measure, which had repeatedly proved discriminating in previous work on this project, was again administered. With use of the same formula (based on a combination of religious, theoretical, and esthetic scale scores) as in previous samples, 70% of subjects in the present group were correctly identified as accident or nonaccident type. This figure is significant at the 0.05 level of confidence and compares with discriminations of 73% in three previous samples.[2]

The Kuder preference record is basically a vocational interest test which yields measures of the extent of the individual's interest along 10 dimensions (outdoor, mechanical, computational, scientific, persuasive, artistic, literary, musical, social service, and clerical). The Kuder test was included in the present battery because previous results with the study of values suggested that other interest measures might also prove discriminating. As it turned out, most of the scales did not prove discriminating. However, a formula based on the computational and scientific scales (on which accident subjects were high) and the persuasive and clerical scales (on which nonaccident subjects were high), made it possible to identify 81% of subjects correctly as accident or nonaccident type. While this figure is significant at the 0.02 level, it cannot be accepted confidently until it has been cross-validated.

TABLE 2.—*Distribution of Character Type Ratings Among Accident-Repeater and Nonaccident Subjects*

	A*	N*		A	N
1. Hysteroid	0	1	8. Neurasthenic	0	0
2. Phobic	1	0	9. Paranoid	0	0
3. Obsessive	0	2	10. Psychopathic	1	0
4. Compulsive	1	0	11. Passive aggressive	2	2
5. Cycloid	0	0	12. Passive dependent	1	1
6. Schizoid	1	3	13. Aggressive reaction	1	0
7. Anxiety state	0	0	14. Intellect disorder	1	0

* A = accident repeater; N = nonaccident.

The American transit motor abilities test, developed by Kraft and his associates [3] in their studies of bus drivers, is intended as a measure of driving aptitude. The subject is seated at the wheel of a mock-up bus and, in response to visual light patterns on a board across the room, is required to carry out various maneuvers with brake, steering wheel, gearshift, and clutch. All responses are recorded electrically. In this situation, accident subjects reacted more quickly and took less time to complete the task but made more errors than nonaccident subjects. All measures were significant at the 0.05 level of confidence or better.

All subjects were examined for psychophysiological responsiveness, under both resting and stress conditions (i. e., before, during, and after presenta-

tion of an incomplete sentences test containing both emotionally charged and neutral topics). The scores obtained included measures of respiration, muscle tension, psychogalvanic skin reflex, heart rate, and a combined measure of over-all reactivity. While wide individual differences occurred among subjects in their psychophysiological responsiveness on all measures, none of the measures proved discriminating between accident and nonaccident subjects, although there was some tendency for the accident group to have a slightly faster heart rate during presentation of the test.

TABLE 3.—*Intelligence Test Scores of Accident-Repeater and Nonaccident Groups*

	Means	
	A*	N*
1. Wechsler adult intelligence scale Prorated intelligence quotient	105.3	106.3
Weighted subtest scores		
Information	10.6	10.2
Comprehension	11.9	12.0
Similarities	10.6	11.4
Block design	11.4	11.9
2. Shipley-Hartford vocabulary score	27.8	25.9

* A = accident-repeater; N = nonaccident.

All subjects were administered two measures of intelligence, a portion of the Wechsler-Bellevue adult intelligence scale (four subtests), and the Shipley-Hartford vocabulary scale. As may be seen from table 3, no significant differences between the accident and nonaccident subjects were obtained on any of these measures. Thus, it would appear that the differences between accident and nonaccident groups which were found on other measures could not be attributed to differences in the over-all intellectual level of the two groups.

In previous phases of this research,[2] subjects were administered the Minnesota multiphasic personality inventory (MMPI) and a social history questionnaire. While neither of these measures as a whole proved helpful, item analysis yielded a number of items which in themselves appeared promising but which required cross-validation before they could be confidently accepted. For this reason, these items were repeated with the present sample of subjects. These items and their level of significance in the 1955 and 1956 samples, as well as in the current study, are shown in table 4. As may be seen, very few of these items continue to prove discriminating with repeated testing. The overwhelmingly negative character of these findings, particularly on the MMPI, appears especially interesting, since these findings conflict with those of other investigators on somewhat similar samples of subjects.[4]

The Rorschach and the thematic apperception test (TAT), which had been individually administered to each subject during the clinical phase of this study and interpreted clinically at that time, were later scored objectively for a number of differentiating characteristics derived from previous samples.[2] The accident and nonaccident groups were compared across scores for these characteristics. On both the Rorschach and TAT scores, the differences between the accident and nonaccident groups were not sufficiently pronounced to meet the 0.10 level of statistical significance required.

Comment

While previous research on the present project demonstrated that the accident-repeater and nonaccident airmen differed significantly from one another, and while certain isolated psychological measures proved highly predictive of accident status for this population, the psychological significance of these measures was difficult to interpret. It was felt that further research was necessary before a clearer understanding of the psychodynamic relationships existing between the structure and functioning of the individual and his accident susceptibility could be achieved.

The primary aim of the present study, therefore, was to obtain a broader knowledge of the characteristics of accident and nonaccident subjects. Twenty representative high-accident and nonaccident rate airmen were studied intensively, using individual clinical psychological and psychiatric techniques, as well as a number of measures of interest, intelligence, psychophysical skills, and psychophysiological functioning.

TABLE 4.—*Summary of Significant Differences Between Accident-Repeater and Nonaccident Groups on MMPI* and Social History Items*

Item	High	1955	1956	1957
MMPI*				
Go to church almost every week	N†	0.05	0.20	ns‡
Never did anything dangerous just for the thrill of it	N	0.20	0.20	ns
Frequently notice hand shaking when trying to do something	N	0.20	0.20	0.20
Used alcohol excessively	A	0.10	0.20	ns
Never been in trouble with the law	N	0.20	0.05	ns
When with a woman a man usually thinks about things related to her sex	A	0.01	0.20	ns
Pray several times a week	N	0.20	0.01	ns
Social history				
Single versus married	N	ns	0.10	0.20
No. of brothers	N	0.01	0.10	0.05
Drink to relax	A	...	0.20	0.10
Father attends church	N	0.10	0.01	ns
Desires to run away from home	A	0.01	0.20	0.10
Have ever been arrested (independent of traffic violations)	A	0.01	ns	ns

* MMPI = Minnesota Multiphasic Personality Inventory.
† N = Nonaccident; A = Accident repeater.
‡ Not significant below 0.20 level.

It is felt that the positive findings of the present study, particularly in the clinical area, contribute materially to a clearer understanding of the relation of psychological factors to accident susceptibility, at least in the population of airmen from which these samples were drawn.

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ALCOHOL IN THE SINGLE VEHICLE FATAL ACCIDENT

EXPERIENCE OF WESTCHESTER COUNTY, NEW YORK

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Records of motor vehicle accidents occurring over an eight-year period were used for the identification of all drivers killed in accidents involving neither other vehicles nor pedestrians. The resulting group of 117 drivers included 87 who died within four hours of their accidents. Postmortem determinations for alcohol were performed in 83 (95%) of these 87 cases. Of these 83, forty-one (49%) were found to have had blood alcohol levels of 0.15% or more at death; and an additional 17 (20%) were found to have levels between 0.05 and 0.15%. There is justification for assuming that any driver with a blood alcohol level of 0.15% or more is incapable of driving safely and that this is also true of many drivers with levels in the 0.05 to 0.15% range. It is therefore concluded that the use of alcohol was probably a causal factor in one half or more of the deaths which resulted from accidents of this type.

Estimates of the frequency of markedly elevated blood alcohol levels among those involved in motor vehicle accidents have ranged from 10 to 80%.[1] It is the purpose of this paper to report the findings of an exploratory investigation designed to quantitate more precisely this factor in a specific group of fatalities occurring in one area and to suggest that similar groups may prove useful for statistical purposes.

Most reports of the frequencies of such postmortem alcohol levels, a number of which have recently been summarized by Plymat,[2] have come from police and related sources. In general, with relatively few exceptions, these have failed both to reach the available scientific literature and to be presented in a sufficiently documented form to permit their complete evaluation from the scientific standpoint. Their value, as a result, is difficult to assess. Taken as a group, however, one or more of a number of substantial shortcomings appear to have been present in many instances. Foremost among these has been the frequent study of only relatively small fractions of the groups of fatalities whose characteristics these fractions were assumed to represent. Furthermore, it has been a not uncommon practice to group the persons killed without reference to their individual responsibilities for the collisions in which they were involved. In addition, some investigators have studied subjects who have died as long as 24 hours after the time of the accident, a procedure which has undoubtedly resulted in the inclusion of some whose original blood alcohol levels had undergone substantial metabolic lowering in the relatively long interval prior to death. Finally, information has often been omitted both as to the biological materials on which the determinations were based and as to the circumstances of their collection.

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In order to avoid these and related deficiencies, the retrospective and exploratory investigation reported here sought, as its primary objective, to determine the levels of alcohol present in the blood of a carefully studied group of drivers, those whose fatal accidents had involved neither pedestrians nor vehicles other than their own and who had survived for not more than a given short period after the event.

Case Material

The group which provided the subdivision used consisted of all motor vehicle fatalities which had occurred in Westchester County from Jan. 1, 1950, through Dec. 31, 1957. To assure completeness, the files of the Office of Vital Statistics in the New York State Department of Health were used to identify all deaths due to motor vehicle accidents in Westchester County during that period. The resultant lists were matched with those of the Office of the Medical Examiner. Of the 626 cases identified in this fashion, 37 were excluded. These consisted of 20 driveway and other off-highway motor vehicle fatalities and 17 borderline cases which, though they had occurred upon public roads more or less in association with motor vehicles, were not considered appropriate for inclusion. Illustrative of the latter group were such cases as those of a single pedestrian suicide and of two persons who fell after alighting from unmoving vehicles. The remaining 589 fatalities formed the basis of the present study.

TABLE 1.—*Classification of Motor Vehicle Fatalities by Age of Person and Type of Specimen Used for Alcohol Level Determination, Westchester County, New York, 1950-1957*

	Age 16 Years and Over						
		With Alcohol Level Determination			Specimen Used		
Class of Fatality	Total All Ages	Total	No.	%	Blood	Brain	Liver
Drivers	208	208	160	77	124	7	29
Single motor vehicle	117	117	95	81	76	4	15
More than one motor vehicle	84	84	58	69	44	3	11
Other and not specified	7	7	7	*	4	...	3
Passengers	197	184	107	58	97	1	9
Pedestrians	177	136	78	57	60	4	14
Others	7	1	0	*	...	...	...
Total	589	529	345	65	281	12	52

* Percentages based on less than 10 observations are not indicated.

Westchester, a wealthy county of 435 square miles located immediately north of New York City, includes urban, suburban, and semirural areas. According to the 1957 special census its population was 752,406, an increase of 126,590 over 1950. Although data are not available as to the number of residents holding driver's licenses, registrations of vehicles of all types are known to have increased during the same period from 213,000 to 308,000. No appreciable information was available either as to the number of miles driven within the county or as to the ways in which vehicles were used, although it is known that much of the traffic load is produced by nonresidents.

Alcohol Determinations

Of the 589 fatally injured persons, 345 (65%) had had alcohol determinations (table 1). Two hundred eighty-one of these were based on blood, 12 on brain, and 52 on liver specimens. These determinations were made with a modification of the Jetter method,[3] a procedure which measures volatile reducing substances, here taken as ethanol. Blood specimens consisted of heart blood drawn at autopsy, in almost all cases prior to the severance of the great vessels. No femoral or other peripheral blood specimens were used. In the several instances in which brain and liver alcohol levels were determined, parenchymal tissue was used. The values given for all specimens are the results of the laboratory determinations, although it is known that brain and liver alcohol levels tend to be substantially lower than the simultaneous blood concentrations.[4] For this reason, the group of liver and brain alcohol values given here may be regarded as a conservative estimate of the blood alcohol levels to which they corresponded.

As noted, postmortem alcohol determinations had been carried out in only a fraction of cases, and only rarely among those under 16 years of age. However, even when limited to those 16 years of age and over, determinations were found to have been performed in the latter group least often for pedestrians (57%) and passengers (58%) and most often for drivers (77%). As a result of the relatively large percentages of these groups lacking determinations, it was not felt that estimates of the distributions of alcohol levels among their numbers could be made without further subdivision.

Results

The total group of 589 motor vehicle fatalities was first analyzed in order to determine whether or not there had been any significant changes over the eight years represented. The variations in the total number of fatalities from year to year proved not to be statistically significant ($p>0.10$). In addition, the variations from year to year by type of accident, class of vehicle involved, class of fatality, and age or sex of the deceased all proved to be not statistically significant ($p>0.10$).

The data for the eight-year period were therefore combined and treated as a single group. When handled in this fashion, there was no statistical significance in the variation in the number of fatalities from month to month ($p>0.70$). However, as anticipated from many prior reports, many more fatalities occurred during the two and one-half day period between 5 p. m. Friday and 5 a. m. Monday than during the remainder of the week. This is

seen in the fact that 277 (48%) of the 573 fatalities for which complete information was available with regard to time and day of accident fell in this 60-hour week-end period. In addition, when distributed by time of day, it was found that 63% of the 573 fatalities resulted from accidents which occurred between 5 p. m. and 5 a. m.

TABLE 2.—*Blood Alcohol Level and Interval Between Accident and Death for Fatally Injured Persons Sixteen Years of Age and Over, with Blood Alcohol Level Determinations, Westchester County, New York, 1950-1957*

Alcohol Level, % by Weight	Total	Interval Between Accident and Death, Hr.			
		<4	4-11	>11	Not Specified
Negative	147	117	21	9	...
0.01-0.04	13	10	2	1	...
0.05-0.09	23	19	3	...	1
0.10-0.14	15	15	...	...	...
>0.14	83	79	3	...	1
Total	281	240	29	10	2

As has been noted, alcohol levels were not determined for all fatally injured persons. Since the minimum licensing age in New York is 16, and since alcohol determinations were rarely carried out on children, the data given in tables 2 and 3 were restricted to include only fatally injured persons 16 years of age and over. From table 1, it is noted that this restriction did not reduce the number of drivers used in this study, since not one of the 208 drivers in the total group of 589 fatalities was under 16.

In order to avoid the reporting of postmortem alcohol levels which had been subject to substantial metabolic lowering during the period between accident and death, it was decided to consider only those persons who had died within four hours of their accidents. Table 2 indicates the effect of this restriction on the composition of the group retained for study purposes.

It was initially believed that the study of those drivers who had had alcohol determinations would make possible the ascertainment of whether or not the levels found in heart blood might have been influenced by diffusion of alcohol from the viscera. Since it was reasonably expected that the presence and magnitude of this possible artifact would be a function of the interval between death and the drawing of the specimen at autopsy, the levels were grouped according to the time which had elapsed before the collection of each individual specimen. In doing this it was observed that most of the cases with the longer intervals between death and postmortem examination were those of individuals who, in being killed as the result of evening and early morning accidents, had not had autopsy performed until the next working day. As a result, the group whose examinations had been most delayed was heavily weighted with cases from that period of day in which a higher percentage of drivers had been drinking and in which relatively higher alcohol levels were present. Because of this selection, it was not possible to demonstrate the presence or absence of an artifact of this type, the possible significance of which is discussed below.

During the eight years studied, 87 single vehicle accidents occurred which involved neither pedestrians nor other vehicles and as the result of which the driver in each case died within four hours of the accident. It will be recalled that it was the description of the blood alcohol levels of this group which constituted the primary objective of this investigation. Fortunately, because of a long-standing interest of the Office of the Medical Examiner [5] in the extent to which alcohol was present among driver fatalities, 83 (95%) of this group had had alcohol level determinations. The resultant data are presented in table 3.

The results given in table 3 show that 41 of the 83 "single vehicle" drivers examined possessed blood alcohol levels of 0.15% or more at the time of death. These constituted 49% of the group. The levels of an additional 17 of this group (20%) fell between 0.05 and 0.15%. In comparison only 22 (27%) were negative. It is noted that the 83 drivers included 7 truck operators, all men, and 6 women operators of passenger automobiles. Of these, one of the former and three of the latter had levels of 0.15% or higher.

Previous Research

The improper use of alcohol as a cause of motor vehicle accidents has been repeatedly reported from many regions of the earth, including Canada, Scandinavia, Germany, France, Italy, the United Kingdom, South Africa, Australia, and the United States. (The *Quarterly Journal of Studies on Alcohol* contains abstracts of technical papers concerned with alcohol, including, in particular, many dealing with motor vehicle accidents.) In view of this, it is remarkable neither that much basic research has been completed nor that much remains to be done.

TABLE 3.—*Alcohol Level by Type of Specimen in Eighty-seven Drivers Involved in Single Vehicle Accidents Who Died Within Four Hours of Accident, Westchester County, New York, 1950-1957*

Specimen Used	Total	Alcohol Level, % by Weight					
		Negative	0.01-0.04	0.05-0.09	0.10-0.14	>0.14	No Examination
None	4	...	...	...	...	...	4
No. examined	83	22	3	11	6	41	...
Blood	66	16	2	6	2	40	...
Brain*	3	1	...	...	2	...	...
Liver*	14	5	1	5	2	1	...
Total	87	22	3	11	6	41	4

* Values shown are actual results of laboratory determinations. Values for brain and liver specimens have not been adjusted for known differences between tissue and blood levels (see text).

In general, research dealing with this problem has largely fallen into two categories: (1) the determination of the extent to which accident liabilities increase in association with blood alcohol level and (2) the determination of the extent to which individuals with such elevated levels are responsible for accidents. Although the present paper is concerned with the second of these research areas, it is appropriate to indicate briefly the findings of the first and to suggest sources of additional information.

Thus, for example, Loomis and West [6] in a recent study with use of "a simulated automobile driving apparatus . . . to evaluate the effect of alcohol as it pertains to several functions involved in driving an automobile," have demonstrated "a direct relationship between the blood alcohol concentration and the extent of impairment of function." Furthermore, these workers found that (1) all of the eight subjects (apparently none of them heavy drinkers) who were tested when their blood alcohol levels were "at or above 0.05% showed some impairment as compared to their control performance," (2) the two subjects who were tested when their blood alcohol concentrations were 0.03% showed performance below control values, and (3) "in the presence of a blood alcohol concentration of 0.15 per cent performance had decreased to approximately two-thirds of the control values." [7]

Other workers, notably Coldwell and others, in "Report on Impaired Driving Tests," [1] and Bjerner and Goldberg,[8] used objectively scored driving tests given to subjects before and after the use of beverage alcohol. In the most recent of these,[1] 50 adult male subjects, including 5 who "habitually consumed, each day, alcoholic beverages equivalent to at least 6 fl. oz. of distilled spirits" and 5 who "consumed twice this quantity daily," repeatedly drove through a standardized test. The many results of this investigation included (1) the finding of one individual whose performance was impaired at a venous blood alcohol level of 0.04%, (2) the demonstration that one-half of the 50 subjects showed objective impairment of driving ability at a venous blood alcohol concentration of 0.08%, and (3) the finding that all subjects exhibited some evidence of impairment at levels less than 0.15%. The authors pointed out that the men were in a competitive situation which placed a premium on optimum performance and that the test was relatively simple, presenting neither the emergencies nor other hazards present in normal driving.

Two additional studies require mention. In the first of these,[9] by the comparison of the blood alcohol levels of 433 drivers involved in accidents with those of 2,015 driver passers-by, three conclusions were reached: "1. The hazard is significant when the blood alcohol concentration is above 0.10%. 2. In the range 0.10-0.15% blood alcohol concentration, the hazard of accident is two and one-half times that when the concentration of alcohol in the blood is less than 0.05%. 3. This hazard of accident when blood concentrations are above 0.15% is approximately 10" (i. e., there were 10 times as many drivers with levels of 0.15% and above in the accident-involved group as in the control group of uninvolved drivers). The second study,[10] through the use of samples obtained from 542 of 919 drivers involved in personal injury accidents, compared the blood levels of those rated highly responsible for the accidents in which they were involved with the levels of those rated as either not responsible or only slightly so and demonstrated an increasing statistical excess of accident-responsible drivers which first became significant in the 0.03 to 0.05% range. Additional research [11] conducted in Sweden, with appropriate controls, has shown that chronic alcoholics and other alcohol abusers were heavily overrepresented in a consecutive series of 2,100 persons convicted of drunken driving.

We do not intend to imply by the title and content of the present paper that we regard the presence of alcohol as the only pertinent characteristic of the individuals described. It might be expected, in fact, that other personal characteristics, themselves associated with individual drinking patterns, would also be related to accident liability. The results of another well-controlled Swedish investigation are of some interest in this connection, however. This study [12] of 71 hospitalized traffic victims showed that, although heavy users of alcohol were highly overrepresented among casualties who had been drinking, they were not overrepresented among those casualties who had not been drinking. These results suggest that the changed liability which the heavy user group exhibited was very closely associated with, if not directly caused by, the use of alcohol.

Medicolegal Interpretations of Blood Alcohol Levels

In the United States, the Uniform Vehicle Code, Model Chemical Test Law, used (July 1, 1957) in 27 of the 48 states,[13] defines (Article IX, Section 11-902) the following presumptions: 1. If there was at that time 0.05% or less by weight of alcohol in the defendant's blood, it shall be presumed that the defendant was not under the influence of intoxicating liquor. 2. If there was at that time in excess of 0.05% but less than 0.15% by weight of alcohol in the defendant's blood, such fact shall not give rise to any presumption that the defendant was or was not under the influence of intoxicating liquor, but such fact may be considered with other competent evidence in determining the guilt or innocence of the defendant. 3. If there was at that time 0.15% or more, by weight, of alcohol in the defendant's blood, it shall be presumed that the defendant was under the influence of intoxicating liquor. (Although there is much individual variation, and although many factors influence the rate of absorption of alcohol and the levels achieved, it

is commonly stated that "In order to obtain a blood alcohol level of 0.05% a 150-lb. (68-kg.) person would have to accumulate 1 fluid oz. (30 cc.) of pure alcohol in his body. To do this he would have to drink at least the equivalent of 2 oz. of 100 proof liquor. This same person would have to accumulate 3 oz. of absolute alcohol to reach a blood alcohol level of 0.15%." [14]) 4. The foregoing provisions shall not be construed as limiting the introduction of any other competent evidence bearing upon the question whether or not the defendant was under the influence of intoxicating liquor.

This corresponds to the position of the American Medical Association, which has long endorsed the same limits, "limits (which) were purposely made liberal so that no injustice would be done to the person with unusual tolerance." [15] Nevertheless, proposals for a lowering of the 0.15% limit to 0.05% have been made.[16] It is pertinent, in this respect, that at a 1952 "meeting of Scandinavian criminologists held in Copenhagen . . . the representative of Norway (which has long enforced the 0.05 per cent limit) . . . criticized the Norwegian . . . limit very strongly" on the grounds that it placed undue emphasis on "a chemical determination." The latter position was not supported, however, by "other Norwegian members of the conference." [17]

Significance of Data

With the foregoing findings as background, it was not considered necessary to prove again that the use of alcohol is a causal factor in some motor vehicle accidents. Furthermore, it was not considered necessary to demonstrate once more that there are substantial differences between the distributions of the alcohol levels among accident-involved drivers and those of the driving populations from which they come. It was the purpose, therefore, of the investigation reported here to determine the extent to which individuals with levels already demonstrated to be associated with markedly increased liabilities were present in a group of drivers killed in single vehicle accidents without pedestrian involvement. Fatally injured persons of this type constitute the only group of persons on whom autopsy is performed who may be regarded without additional evidence as having been responsible in most cases for the accidents which cause their deaths. This group offers, as a result, opportunities for study which are not present when pedestrian and multivehicle accidents are considered, since information concerning the principals (i. e., all involved drivers and pedestrians) in, and circumstances of, such events is seldom complete. It also requires neither the personnel nor the expenditures which are required for the collection and analysis of specimens from the principles involved in the more complex varieties of accidents.

An additional reason for choosing one accident type stems from the increasing tendency in this field to compare the alcohol levels found among accident-involved drivers and pedestrians in different communities and jurisdictions. Unfortunately, such comparisons have frequently grouped together dissimilar types of accidents and, in addition, have compared groups of data weighted with those particular combinations of accidents most common in each area considered. If such inevitable comparisons are to be made, it would appear essential that, whenever possible, they be based on the use of careful breakdowns into similar accident categories, since it would be expected that the causes of accidents might vary considerably from one type to another. It is suggested, therefore, that the alcohol levels found in drivers in the "single vehicle group," as used and defined in this paper, may serve as the basis of one form of comparison between jurisdictions which have sufficient fatalities to allow their subdivision to this extent.

This proposal for the use of comparisons based on the levels found in this group is based, as has been noted, on a number of practical limitations in the extent to which inferences may be founded on examinations of motor vehicle fatalities. As such, it too has limitations. The first of these results from the fact that knowledge in this field is so incomplete that it is at present seldom possible to extrapolate quantitatively from fatal to nonfatal accidents or the reverse, a point which is commonly overlooked. In addition, quantitative extrapolations from the single vehicle group to pedestrian and multivehicle accidents must also await the results of additional research dealing with these groups, although it is well known that many of the multivehicle and pedestrian accidents which have occurred in Westchester and elsewhere have been caused by drivers and pedestrians who were drunk at the time.

It should be noted in this context, however, that related information has long been available concerning the experience of one community, Uniontown, Pa., with another group of drivers presumably responsible for the accidents in which they were involved. Thus, Heise found, in a pioneering investigation reported in 1934, that the alcohol levels of a consecutive series of six apprehended "hit and run" drivers fell between 0.21 and 0.38%, the mean value being 0.30%. By contrast, on the basis of 119 consecutive accidents, he also concluded with respect to pedestrian accidents that "the drivers who struck children or old people were in most cases sober," and that "the largest number of accidents in this group . . . [involved] the drinking pedestrian." [18] This again suggests the need for the careful separation of accidents into discrete categories and the caution which should be used in attempting extrapolations from one group to another.

The limitation of the present series to those dying within four hours of their accidents was based on a compromise between the relatively rapid rate at which alcohol is known to be metabolized [19] and the need for including as many cases as possible in

order to facilitate their analysis. In recognizing that the levels in many individual cases have been shown to remain elevated for much longer periods after ingestion than this,[19] it must nonetheless be remembered that many of those killed may well have already been on the descending slopes of their blood alcohol curves at the times of their accidents. For this reason, the four-hour interval is believed to represent a conservative compromise, one that is also supported by the fact that the levels found among those who had died between 4 and 12 hours after their accidents tended to be lower than those found among persons who had died in a shorter time. It is of further interest that 219 of those listed in table 2 had died within two hours and 199 within one hour of their accidents, a point which also has significance from the standpoint of the organization and emphasis of emergency medical care.

It has been mentioned that heart blood had served as the basis for most of the alcohol determinations on which this study was based and that no femoral or other peripheral specimens had been used. This point is emphasized because of the considerable literature dealing with the meaning and relationships of alcohol levels as determined from various portions of the cardiovascular system.[20] Thus, it has long been known that during the stage of active absorption of alcohol from the gastrointestinal tract the levels present in the venous return from the limbs may be considerably lower than those found in blood drawn from the heart, a difference which is attributed to the comparatively long time required for the levels in the relatively avascular tissues of the extremities to come into equilibrium with those of the arterial blood.[4] In addition, Gifford and Turkel have demonstrated in a series of 11 cases that whiskey introduced into the stomachs of nonalcoholic cadavers on which autopsy was performed 10½ to 24 hours later consistently produced alcohol levels in heart blood. This suggested that similar false elevations might occur in the heart blood of fatally injured persons whose viscera contained high concentrations of alcohol as the result of the use of alcoholic beverages shortly before death. Since these workers also demonstrated in this series that diffusion into the femoral blood was negligible, it became possible for them to compare individual postmortem heart and femoral alcohol levels in an investigation of the extent to which such an artifact might be present in actual practice. This was done in a series of 51 alcoholic cadavers. The results indicated that the discrepancy sought might prove of considerable medicolegal importance in occasional cases. It was also demonstrated, however, that the average excess of the heart blood alcohol level over that found in the femoral vein was slightly less than 0.01%.[20b] In view of the latter finding, it is considered improbable that such a diffusion artifact had to any appreciable extent influenced the alcohol levels given in the present report.

The results of the investigation reported here show that at the time of death 49% of the drivers killed in single vehicle, nonpedestrian accidents possessed blood alcohol levels of 0.15% or more by weight. These levels are widely accepted on the basis of a considerable body of scientific knowledge as presumptive evidence of drunken driving. An additional 20% of the drivers in this group possessed levels between 0.05 and 0.15%. As discussed above, it has been shown that many persons with levels in this range not only exhibit measurable deteriorations in driving performance but also are overrepresented in accident groups.

In view of these findings from Westchester County, it is appropriate to question the extent to which similarly elevated levels might be found elsewhere in fatally injured persons of this type. Fortunately, one set of data already existed which was indicative of the somewhat comparable experience of another section of the United States. Thus, the Delaware State Police have studied all fatal accidents occurring each year at locations outside of the city of Wilmington, with particular reference to the alcohol levels of most principals. As a result it has been possible, on the basis of data made available to us through the courtesy of the Delaware authorities,[21] to identify a group of fatally injured drivers similar to the single vehicle drivers studied in this report. This group consists of the 15 fatally injured drivers during 1957 whose passenger automobile accidents involved neither pedestrians nor other vehicles and who were listed as having died either at the scene of the accident or prior to arrival at the hospitals to which they were taken. Ten (67%) of this group were found to have blood alcohol levels of 0.15% or more, and two had levels between 0.10 and 0.15%. These data suggest that the high alcohol levels observed among drivers killed in single vehicle accidents in Westchester County may exist in other sections of the United States.

In conclusion, it is recalled that Heise stated in 1934 "that the problem of controlling the drinking driver and pedestrian is far from being solved may be due, in part, to the fact that no accurate statistics are available regarding the relationship of alcohol to automobile accidents. . . ."[18] On the basis of the findings presented in this report and previous work in this field, it appears highly probable that the use of alcohol was a causal factor in the deaths of one-half or more of the drivers killed in the single vehicle accidents which occurred in Westchester County over an eight-year period.

Summary

The postmortem blood alcohol levels were studied in a group of 83 drivers whose fatal accidents involved neither pedestrians nor other vehicles and whose deaths followed within four hours.

Forty-nine per cent of the 83 were found to have had blood alcohol levels of 0.15% or more at death, while those of an additional 20% fell between 0.05 and 0.15%. From this and previous studies it is concluded that it appears highly probable that the use of alcohol was a causal factor in the deaths of one-half or more of the drivers killed in the single vehicle accidents which occurred in a suburban county over an eight-year period.

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CARBON DIOXIDE POISONING.—Although rarely reported, carbon dioxide poisoning is probably not so infrequent an occurrence. . . . Early in March, 1956, a liner arrived at Penang with a cargo of onions. The particular hold had been loaded six days previously, and contained 5,000 bags of onions and a quantity of . . . a crude brown sugar obtained from the sap of palm trees. It was full to within 9 ft. (2.7 m.) of the deck. At about 1 p. m. the ship was boarded by labourers, who removed the hatch covers and opened the hatch. One entered the hold and collapsed as he was standing on the onions. Another went in to help him and also collapsed. Then the ship's doctor was sent for; he went into the hold, followed by one of the ship's officers, and assisted him to lift the unconscious man who had first entered the hold. As he was doing so the doctor collapsed, and the ship's officer carried the man out. One of the ship's crew then went into the hold to assist, but he collapsed. Another ship's officer then entered with breathing apparatus, and brought out the doctor and the other unconscious men. The four men who had collapsed were then taken to hospital, where it was found that two of them were dead. Four other labourers who had also entered the hold for short periods developed minor symptoms and were taken to hospital. . . . An analysis of the gases present in the hold was carried out by the senior chemist about an hour and a half after the hold had been opened. He obtained an appreciable reaction for carbon dioxide in the hold, particularly beneath the deck; and on examining other holds in the ship, as yet unopened, he obtained a strong reaction. No other poisonous gases were detected.—H. I. Williams, M.D., B.Chir., Carbon Dioxide Poisoning, *British Medical Journal*, Oct. 25, 1958.

POSTERIOR COLPOTOMY INCISIONS IN GYNECOLOGIC DISEASE

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Posterior colpotomy has the advantage over culdoscopy and colpocentesis in that it gives much more diagnostic information. It is safer than anterior colpotomy, which has to be done with special care to avoid the bladder, ureters, and perivesical venous plexuses. Moreover, by extension of the incision after diagnosis and using proper retraction, considerable pelvic surgery can be accomplished. Colpotomy was carried out in 94 women, the most frequent indication being ovarian cyst (29 cases). In the technique which is described, a posterior incision was used in all but two cases. The most frequent findings were ovarian cyst (34 cases) and pelvic inflammatory disease (17). Recovery was uncomplicated in 84 cases; five patients had postoperative complications and five others subsequently underwent laparotomy. The results justified the procedure, which is less traumatic than exploratory laparotomy and can be used in many situations in which an exploratory laparotomy is not really indicated.

With the increased interest in vaginal hysterectomy and vaginal surgery in general in the past 25 years, the use of a posterior, and occasionally an anterior, incision of the vaginal wall for exploration of the pelvis should be more widely known and practiced. Posterior colpotomy has been disregarded for many years as either a diagnostic or a therapeutic measure in gynecology. The literature of 50 or 60 years ago contains numerous papers on this subject. The primary reason for the disuse of the procedure has been the increasing safety of an anterior abdominal wall incision. Such an incision provides maximum exposure in the pelvis, and it is this improvement in exposure and the allowance for wider surgical performance that has led to the abandonment of colpotomy as a popular procedure. Posterior cul-de-sac puncture (colpocentesis) and culdoscopy have, however, enjoyed some measure of interest in recent years, and in view of modern medical economics, improved techniques in anesthesia, and the generalized use of antibiotics it is important to reconsider the use of colpotomy incisions in gynecologic diagnosis and therapy.

The term colpotomy covers three procedures. In the first, puncture colpotomy, a needle or trocar is used in the posterior cul-de-sac for intraperitoneal aspiration. This is in reality a colpocentesis. The second is a small posterior cul-de-sac incision for the intraperitoneal insertion of the culdoscope. The third is a wide incision (3 to 6 cm.) penetration of the posterior cul-de-sac into the peritoneal cavity. This can be accomplished anteriorly under the bladder but with greater difficulty.

The advent of the culdoscope has made possible the use of the posterior cul-de-sac as an avenue of exploration for diagnosis in the pelvis. This is primarily a diagnostic instrument, although Decker has reported using it for ovarian biopsy and the collection of an ovum at the time of ovulation.[1] While culdoscopy is a great improvement over colpocentesis, it entails the added difficulty of proper positioning of the patient for adequate examination. This is no easy task in many instances. Also, the reversal of the normal position of the pelvic organs, as seen through the culdoscope, occasionally gives a distorted pathological impression, and the magnification of the lenses of the instrument often gives a false interpretation of the pelvic findings. It is, however, a fine diagnostic tool, and its use is more feasible for diagnostic procedures in the pelvis generally than colpocentesis. Culdoscopy has been carried out in office practice, but this is not recommended.

Diagnostic information obtained by colpocentesis is much more limited. By this method different kinds of fluid from the abdominal cavity can be obtained through a needle or trocar. This is a very confined diagnostic medium and, in fact, is often unreliable. The dangers inherent in blind puncture of the cul-de-sac and the undependability of findings have led to the condemnation of the method by many gynecologists. The primary therapeutic use of colpocentesis is drainage of a cul-de-sac abscess. The number of procedures that can be accomplished through either a posterior or anterior colpotomy approach is far greater than that possible with either colpocentesis or culdoscopy.

Methods

There are two types of difficulty that may arise in connection with colpotomy: preexisting factors rendering exposure difficult, and surgical complications. Among the anatomic causes of preexisting difficulty are obesity; contracted vagina (long, narrow, small, and senile); virginal inlet; nulliparous inlet; and pregnancy. Pathological causes of pre-

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existing difficulty include pelvic adhesions (pelvic inflammatory disease or endometriosis); pelvic carcinoma; uterine and cervical myomas; intestinal tumors; and solid ovarian tumors. Possible intraoperative surgical complications include perforation of the intestine (usually of the rectum); spillage of intestinal contents; ovarian cysts (dermoid or malignant); hemorrhage; and, with anterior colpotomy, injury to the urinary tract. Possible postoperative complications include intraperitoneal and extraperitoneal hemorrhage; vaginal cuff hematoma; infection; and painful vaginal scar.

In general, contraindications to colpotomy include severe chronic pelvic inflammatory disease; extensive intra-abdominal adhesions; endometriosis; ruptured ectopic pregnancy (with patient in shock); large intra-abdominal tumors; known ovarian carcinoma; and cases in which the cul-de-sac is not obviously free.

Ninety-four patients were subjected to colpotomy. A listing of the procedures accomplished follows. These patients came from private practice, the U. S. Army Medical Service, and the University of Oregon Medical School Hospitals and Clinics. The method was adopted in order to evaluate its applicability to modern approaches in gynecologic diagnosis and treatment. Certain observations were proposed in order to do this. The technique used was a simple one, similar to that of Bradbury.[2]

Technique.—With the patient in position as for lithotomy, the posterior cul-de-sac is identified and traction put on the vaginal mucosa with an Allis tissue forceps placed near the cervix, which is also on traction (fig. 1). A transverse incision from 3 to 6 cm. in length is made in the vaginal mucous membrane (fig. 2), the peritoneum is identified and entered (fig. 3 and 4), and the lip of the posterior retractor is placed in the peritoneal opening, which may be retracted anteriorly with use of a Deaver retractor. The uterus is then retroflexed for better exposure when necessary. On conclusion of the pelvic exploration or surgery, the peritoneum is closed (fig. 5) with a purse-string suture of fine chromic catgut. The vagina is then closed (fig. 6) with a running suture of the same catgut. Usually no packing is placed postoperatively, but this may be done if there is excessive oozing.

In this series the posterior incision was used throughout, with the exception of an anterior approach to an anterior ovarian cyst in one case and to an unruptured ectopic pregnancy in another.

Procedures Performed.—In the 94 women in this study on whom colpotomy was performed, there were many different indications for this operation. They included known ovarian cyst (29); known ectopic pregnancy (3); adnexal mass (18); tubal ligation (10); and miscellaneous (6). On the basis of general diagnosis alone 14 patients underwent the operation, and in 18 it was performed as part of an infertility study.

Posterior or anterior colpotomy with a large incision allows for maximum maneuverability and a wide choice of diagnostic and surgical therapeutic procedures. It enables the operator to make a satisfactory and complete diagnosis in the pelvic area. There is no distortion by magnification, and the organs are in their normal relationships. Diagnostic procedure or surgical intervention does not necessitate any change of position or draping. The incision can always be extended, if necessary, and with proper retraction considerable pelvic surgery can be accomplished.

The following are procedures carried out in this series: (1) exploration of the pelvis for differential diagnosis; (2) salpingectomy, unilateral and bilateral; (3) resection of ovarian cyst, unilateral and bilateral; (4) oophorectomy, unilateral and bilateral; (5) bilateral wedge resection of the ovary; (6) lysis of ovarian, tubal, uterine, intestinal, peritoneal, and omental adhesions; (7) visualization of the appendix and cecum; (8) evacuation and drainage of large ovarian cystic structures; (9) infertility studies (including direct observation of the ovary, for example, to see and perhaps even perform a biopsy on a corpus luteum; observation of fallopian tubes with injection of methylene blue to determine patency; removal of previously placed plastic tubes and hoods; tubal plastic operations; and observation of ovulation); (10) sacrouterine neurectomy; (11) sacrouterine plication for third-degree retroflexion and retroversion; (12) Pomeroy's operation (ligation and resection of fallopian tubes); (13) removal of ectopic pregnancy, ruptured and unruptured; (14) excision of enlarged cysts of Morgagni; and (15) removal of pedunculated myomas.

Anterior colpotomy can also be done for anterior ovarian cyst or for ectopic pregnancy which cannot be brought down into the posterior incisional area. This involves more dissection but can be done without great difficulty when the patient is a multipara. Particular attention to anatomy, especially to the bladder and ureters, and care in making the incision sufficiently wide, are factors which facilitate the anterior approach. It is advantageous to be able to use the anterior approach under certain circumstances; for example, in a situation in which it is not possible to turn the uterus into retroversion, when this is needed. Care must be taken to avoid the bladder or ureters as well as the perivesical venous plexuses.

Findings and Results.—At colpotomy were found ovarian cysts (34); ectopic pregnancies, ruptured (3) and unruptured (2); pelvic inflammatory disease (17); postoperative adhesions (6); endometriosis (5); and myoma (1). In 30 patients no gynecologic disease was found. Of the 14 patients who underwent colpotomy on the basis of general diagnosis alone, 2 had ectopic pregnancies; 2, ovarian cysts; 3, pelvic inflammatory disease; 2, postoperative adhesions; and 5, no gynecologic disease. Of the 18 patients in

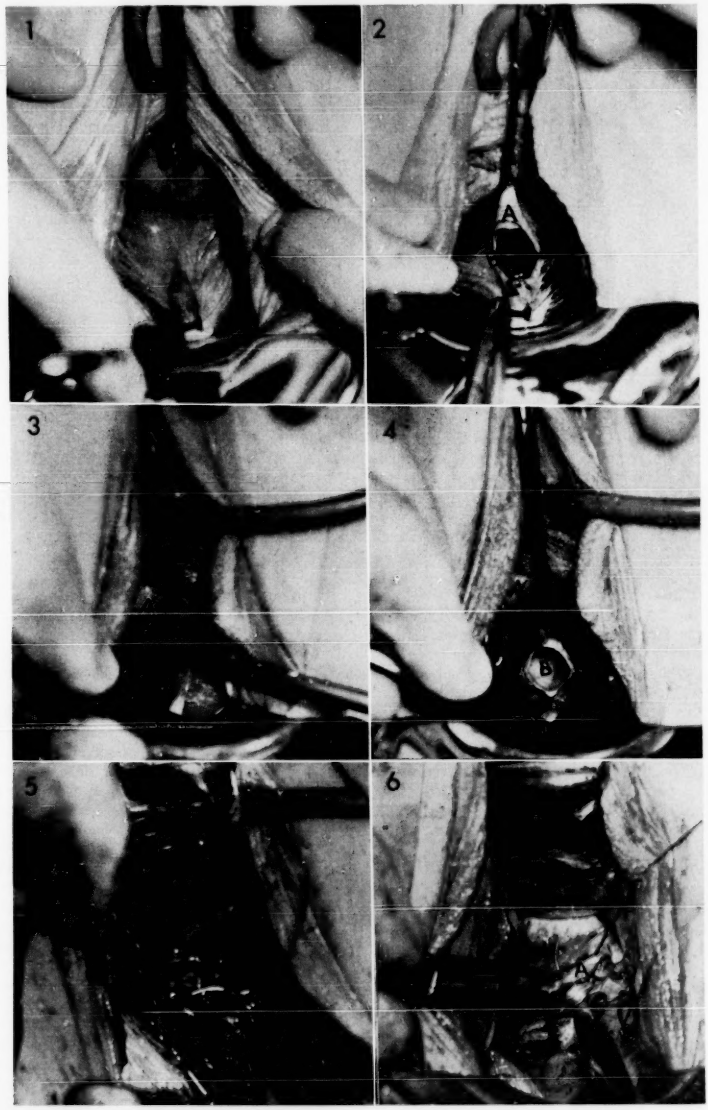

Fig. 1.—Exposure of posterior cul-de-sac. *A*, cervix; *B*, posterior vaginal mucosa. Fig. 2.—Incision in vaginal mucosa. *A*, vaginal mucous membrane; *B*, incision. Fig. 3.—Scissors incision of peritoneal membrane. *A*, vaginal mucous membrane; *B*, peritoneum. Fig. 4.—Incision through peritoneal cavity, later extended as necessary. *A*, vaginal mucous membrane; *B*, peritoneal cavity opened. Fig. 5.—Purse-string suture for closure of peritoneal incision. *A*, vaginal mucous membrane; *B*, peritoneal edge. Fig. 6.—Vaginal mucous membrane, closed with running suture. *A*, membrane.

whom the indication for colpotomy was the presence of an adnexal mass, 2 had ovarian cysts; 14, pelvic inflammatory disease; and 2, endometriosis.

The 34 ovarian cysts found in the sample were classified as follows: dermoid, 3; pseudomucinous cystadenoma, 1; fibroma, 1; endometrioma, 2; polycystic disease, 5 (inflammatory, 4; Stein-Leventhal, 1); Morgagnian, 1; corpus luteum, 10 (5 with and 5 without hemorrhage); and follicle, 11 (3 with and 8 without hemorrhage).

Of the 94 patients in the sample, 84 had an uncomplicated recovery. Five developed postoperative complications and five subsequently underwent laparotomy. The entire procedure was unsuccessful in only three. The average postoperative stay in hospital for all patients was three and one-fourth days. The results are a justification of the procedure, which is less traumatic than exploratory laparotomy and can be used in many situations in which an exploratory laparotomy is not really indicated.

Comment

The primary value of colpotomy is investigation of the pelvis by direct exploration without laparotomy. It is of further importance that such exploration can be followed by surgical therapeutic measures at once from below. It is especially useful in relation to tubal and ovarian disease. It has a specific use in the observation and treatment of symptomatic, persistent, small ovarian cysts in young women. These smaller masses have been a matter of concern to gynecologists for a long time, because when the final diagnosis and treatment of these masses indicates an abdominal incision, it is not a minor matter. Many ovarian cysts can be observed, resected, or removed through a posterior colpotomy incision, thus eliminating the necessity for abdominal exploration.

It is unfortunate that one of the least diagnosed diseases in gynecology is ovarian cancer. More frequent use of the posterior colpotomy incision facilitates the early diagnosis of this disease, because one of the most valuable aspects of the procedure is the direct observation of ovarian tissue. The presence of a solid or questionable tumor is an indication for laparotomy. If the cyst should prove to be innocent, it often can be removed vaginally. Intraperitoneal fluid can be aspirated and spun down to verify an unusual or questionable lesion whenever indicated. What is most important is that, since this is relatively a less complicated procedure than the abdominal exploratory operation, familiarization with its use will lead to earlier and more frequent intraperitoneal investigation of ovarian masses. Conservation of the ovary is the best practice except when such conservatism leads to the preservation of an ovarian cyst for an extended length of time, bringing about eventual necrosis of ovarian tissue.

Another important application is that it is possible, when a diagnosis of mild pelvic inflammatory disease is made, that lysis of tubal adhesions can be accomplished, thus occasionally making it possible to establish tubal continuity or to prevent the continued formation of adhesions which permanently destroy the tube.

In the presence of other pelvic disease, posterior colpotomy can easily be converted to vaginal hysterectomy or pelvic repair, if such procedure should be indicated at the time of surgery. It has long been a practice of a well-known gynecologist (Dr. Allen of Chicago) to do a posterior colpotomy, along with a dilation and curettage, prior to every vaginal hysterectomy. This simple transvaginal incision has been extended in this series to include sacrouterine neurectomy in cases of dyspareunia, dysmenorrhea, pelvic pain, and some cases of infertility.[3] Section of the sacrouterine ligaments can be done to enlarge the incision. Plication of these ligaments without section can be done for the prevention of enterocele.[4] The transvaginal approach to the peritoneal cavity has great value for women, correctly or incorrectly labeled hysterical or neurotic, who manifest a desire for repeated abdominal operations for vague pelvic or abdominal pain. In these instances it is of great help to be able to eliminate doubt as to real or fancied pelvic disease.

It has long been felt that the freeing of one set of adhesions through an abdominal incision has merely served to create another set. Yet there are many individuals who are relieved for a long time by the lysis of pelvic or postoperative abdominal adhesions through a colpotomy. The same is true in an apparently symptomatic pelvic condition in which a definite diagnosis of uterine or adnexal disease cannot be made. The symptoms are often of a nature which makes it impossible to examine or evaluate these patients adequately. In such patients the use of the posterior colpotomy is valuable not only in obtaining factual knowledge but also for psychological reasons. The use of the operation in these cases provides a simple and satisfactory exploration for diagnosis without involving the patient in an abdominal laparotomy. Its advantages over laparotomy are that it is, by contrast, a minor procedure; that postoperative convalescence is much shorter; that postoperative discomfort and complications are greatly reduced; that there is less tissue trauma; that symptomatic, intra-abdominal adhesions are fewer postoperatively; that the time required for the procedure is less; and that the operating room set-up is the same as for simple dilation and curettage.

The use of posterior or anterior colpotomy is by no means a panacea in gynecology, but it does have major advantages as a diagnostic and therapeutic tool which have been overlooked for too long. Its

use can contribute in great measure to early diagnosis of ovarian carcinoma. It also permits many gynecologic diagnostic and surgical procedures to be accomplished at far lower cost and with much less hospitalization than are involved in exploratory laparotomy.

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FUNCTIONAL FASHIONS FOR THE PHYSICALLY HANDICAPPED

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The need of specially designed garments for physically handicapped people is becoming evident from the statistics regarding various types of disability in this country. The need can be met by a constructive program. Examples are given of clothing that is easy to put on, wear, and take off, that resists the friction of crutches and the strain of laundering, and that improves the morale of severely disabled persons. A coat-dress and a suit-dress for women and slacks for men are described in some detail. Continued research on patterns and fabrics is necessary. Problems of direct mail selling must be solved. Concerted effort in this field will help to overcome existing difficulties in the way of self-help, vocational rehabilitation, and social adjustment for millions of handicapped people.

As the result of a three-year research program, physically handicapped persons now have available for the first time a number of specially designed garments which combine fashion with function. The project had its inception when Mrs. Helen Cookman, a top "name" designer in fashion circles, was invited to become the consultant in clothing for the disabled to the Institute of Physical Medicine and Rehabilitation, New York University–Bellevue Medical Center.

Prior to this time, the occupational therapy division of the Institute of Physical Medicine and Rehabilitation had been concerned with the lack of specifically designed clothing for physically handicapped persons as a part of its long-term activities in the design, testing, and dissemination of information of self-help devices for the handicapped under a grant from the National Foundation.[1]

Definitive statistics are not available on the numbers of persons with varying types of physical disabilities who might profit from the availability of specially designed clothing. An approximation of the number, however, is indicated by the estimate that over 1,800,000 persons in the United States have suffered from strokes. The need for such clothing had made itself evident not only through the needs of the patients at the Institute of Physical Medicine and Rehabilitation but through numerous letters received regularly requesting information on the possible availability of such clothing.

Prior research by the staff of the Institute of Physical Medicine and Rehabilitation had shown that the clothing problems of physically handicapped persons centered around (1) design to permit greater ease in putting on and removing garments by individuals with limited muscle strength and limited range of motion in the various joints and by individuals who rely on braces, crutches, wheel chairs, and other mechanical aids; (2) design to permit greater social acceptance and increased self-esteem by severely disabled persons; (3) fabric choice to resist the undue wear caused by greater tension on the cloth as a result of the more strenuous physical activities required by certain disabled persons in dressing and undressing; undue wear caused by the friction of braces, crutches, wheel chairs, and other appliances and devices; and laundering and related care of clothing.

The results of the three-year research effort headed by Mrs. Cookman were first presented at a press showing in New York last October and then at another showing later that month before the

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annual meeting of the American Occupational Therapy Association. There were 17 models presented at these showings—tailored suits, slacks, blouses, dresses, dinner skirts, and gloves for women, and vests, shoes, ties, and suits for men.

Each of the models had been thoroughly trial-tested prior to manufacture. Testing based on function, utility, and fabric choice was conducted over a six-month period by disabled patients and staff members of the Institute of Physical Medicine and Rehabilitation, a number of whom wore each of the various models. Their suggestions were incorporated into redesigns, and then the redesigned models were tested.

Fabrics were chosen with deliberation after many months of checking with the Du Pont laboratories. They are mostly wash-and-wear nylons and Dacrons stitched with the strongest threads available, but care has been taken that the fibers do not generate too much electrostatic charge and will not cause wheel chair problems by sticking instead of sliding. Emphasis was also given to the use of closures which could be easily managed.

Currently six of the items in the collection have been produced by a new, nonprofit organization, Clothing Research, Inc., which is conducting a market test through the direct mail selling of these items. A large number of organizations contributed materials, skills, and time to the production of the current inventory of Clothing Research, Inc. Proceeds from the sale of these garments will be used for the further testing and development of new garments. Catalogs of the six items now available can be secured from Clothing Research, Inc., 307 W. 38th St., New York 1.

The Coat-Dress

Among the six items now available is the coat-dress (fig. 1 *A* and *B*). This garment was specially designed to counteract the destructive effect of crutch-walking on clothes—the pull across the shoulder blades and wear under the arms; to give greater ease in putting the garment on and taking it off; and to give greater comfort in wearing. The coat-dress is cut with extra width across the shoulders to provide more room for crutch-walking. Material is double under the arms at the side seams so that when the fabric wears from the crutches, the top fabric may be turned in for additional services from the fabric underneath.

The bodice is styled to hug the neck close and is cut wide across the chest so that crutch-walking motions will not pull it open. Sleeves are roomy enough to allow for well-developed arm muscles.

A, coat-dress, opened; *B*, coat-dress, closed; *C*, suit-dress; and *D*, man's slacks.

The garment is buttonless and utilizes a single extra-large hook and bar closing at the waistline, thereby making dressing and undressing simple. The generous overlap of skirt insures that the dress will not come open, regardless of how active the wearer may be. The coat-dress is available in three colors in a range of sizes in crisp, crease-resistant fabric of 50% viscose rayon and 50% acrylic fiber (Acrilan).

The Suit-Dress

The currently available suit-dress (fig. 1*C*) is a classic, tailored garment with special features of value to crutch-users. These special features include inverted action pleats coming from the shoulder in front and a pleat at the center back allowing needed roominess for crutch-walking, for rising from chairs, and for getting in and out of an automobile. As

with the coat-dress, fabric below the arms at the sides is double-thickness to withstand the rubbing action of crutches; when the top fabric wears through, it can be turned under a new, unworn piece of suit material. The jacket sleeves are made to allow for well-developed arm muscles.

The skirt has a heavy-duty, easy to reach, extra-long 12-in. zipper. The waistband closes with a new miracle fabric closure (Velcro). The wearer merely presses it shut and tiny nylon links mesh together to form a band that holds firmly but opens quickly and easily at a gentle tug.

The suit-dress is currently available in three colors in a range of sizes in a smartly slubbed menswear suiting fabric of year-around weight of 45% viscose rayon and 55% polyvester fiber (Dacron).

Other garments now available for women include slacks, a belt-pocket unit, and a wheel chair cape.

Men's Slacks

The only item currently available for men is slacks (fig. 1*D*), which have the following features: (1) two-way, heavy-duty, side-seam gripper zippers that open either top or bottom, and wide zipper facings that protect the leg and prevent zipper sliders from snagging underclothing; (2) button tab waistband fastenings and zipper fly front closing; (3) inside half belt that may be worn either toward front (for front drop) or toward back (for back drop) and that may be adjusted by changing button location on inside of waistband; (4) two front pockets with opening angled for easy access when sitting and two back pockets (one with button closing); (5) pleated fronts for comfort when sitting; (6) lined knees to protect pant legs from the abrasive action caused by knee locks of braces; (7) precuffed bottoms (when ordering, exact measurement of both waist and inseam must be given); (8) ample material in seat seam and at waist to allow for alteration if required; and (9) belt loops in matching fabric and color to be attached by wearer if he wishes to use a belt.

The men's slacks are available in two colors in a range of sizes in a medium-weight gabardine of 35% viscose rayon and 65% Dacron.

If the current market test indicates a sufficient market for the specialized line of "Functional Fashions for the Physically Handicapped," additional garments will be produced as the designs become available and will be distributed through normal commercial distribution channels.

In the meantime, while the market test is under way, research, development, and testing of new garments by the Institute of Physical Medicine and Rehabilitation will continue with the aid of a grant from the Office of Vocational Rehabilitation, Department of Health, Education, and Welfare. It is hoped that the project will eventually be extended to cover all basic garments for children of all ages and winter outwear, rain wear, sleeping garments, underclothing, and other garments for handicapped men, women, and children.

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SARCOIDOSIS AND THE KVEIM REACTION.—There is now evidence that sarcoidosis may be caused by an acid-fast spore, which is a pine-tree pollen. The occurrence of the disease predominantly in areas of pine-tree forests and among the rural residents of such areas, the recovery of the spore from patients and other findings recently reported indicate that the etiology of this disease may soon be known. The frequent difficulty in differentiating this disease from tuberculosis is not often overcome by the use of globulin determination, as the same change occurs in both diseases. Although the alpha fraction is often elevated along with the gamma globulin in tuberculosis and the gamma fraction is usually much more elevated in sarcoidosis, often recourse must be had to other laboratory means such as radiographic, bacteriologic and biopsy. The recently described Kveim test is said to be specific in the diagnosis of sarcoidosis. The Kveim reaction in sarcoidosis is a valuable diagnostic test. It is performed by the intracutaneous injection of a heated sarcoid lymph node or splenic suspension. If the test is positive, a violaceous papule appears at the site of inoculation within 3 weeks. It may reach a diameter of 5 to 10 mm. in 6 to 8 weeks. The lesion is similar histopathologically to sarcoidosis. The test is highly specific. Since it requires sarcoid material as a necessary ingredient, it is probably in the nature of an antigen-antibody reaction. In support of this are the following experimental findings: if gamma globulin from a sarcoidal patient or Kveim antigen is injected into a normal skin, only a mild reaction occurs; however, if they are mixed and then injected, a lesion similar to a typical sarcoid results.—P. G. Weil, M.D., Plasma Proteins, *American Practitioner and Digest of Treatment*, September, 1958.

DEPRESSANT ACTION OF LOCAL GASTRIC HYPOTHERMIA ON GASTRIC DIGESTION

USE IN CONTROL OF MASSIVE HEMATEMESIS

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and
Ward O. Griffen Jr., Minneapolis

The retardation of peptic digestion at low body temperatures first observed in vitro was found to be equally striking in vivo. Small animals, if sufficiently chilled and supplied with oxygen, were protected from digestion in the stomach of larger animals. This fact was applied in treating 19 patients who had unrelenting hemorrhages from the duodenum, stomach, and esophagus. A technique was evolved for circulating a coolant through a system of tubes and balloons in the stomach. The first experiences were encouraging, particularly in nine patients who had been bleeding profusely from duodenal ulcers and who ceased to bleed on cooling without recourse to operation. This therapy is rational for situations in which the digestive activity of gastric juice may be responsible for continued erosion and hemorrhage. It should not be relied on in situations complicated by blood dyscrasias, carcinoma, and other miscellaneous disorders.

William Beaumont and Alexis St. Martin more than a century ago wrote into the history of gastric physiology an immortal chapter on the nature of gastric digestion. Beaumont pursued relentlessly investigation of the digestive action of gastric juice on foods introduced into the stomach of Alexis St. Martin, a young French Canadian engaged in fur trading, who suffered a shotgun blast into his upper left abdomen and thorax which exposed the lung and tore a large rent in the anterior gastric wall. Beaumont managed the care of this mortal wound so skillfully that St. Martin, after a period of disability of three years, was restored to good health. Then began a series of observations interrupted by a period of four years in which Beaumont found it necessary to institute a search for the whereabouts of his unwilling subject who had absconded to Canada. These studies were commenced at Fort Mackinac Island, in the straits of Sault Sainte Marie, and continued, after St. Martin's long unannounced leave, at Fort Crawford in Prairie du Chien, Wis. All of Beaumont's experiments were done in military outposts of the United States Army; the final observations and experiments were performed in the city of Washington, and at Fort Niagara, N. Y. While his assignment was to look after the militia who aimed to preserve peace with the Indians in the areas of military outposts on the frontier, Beaumont found time to perform experiments on gastric secretion and digestion which excite our admiration today.

Beaumont's first publication was brief, recording three experiments performed in 1825. His epoch-making monograph summarizing his studies was published in 1833. Forty years after the appearance of this distinguished work, entitled "Observations on Gastric Digestion," there were still skeptics who were not convinced that the stomach secreted hydrochloric acid. In fact, Austin Flint Jr., who began his career as a physiologist in Buffalo, near where Beaumont performed his last observations on Alexis St. Martin in 1833, believed (1873) that the chief secretion of the stomach was lactic acid. He had been abetted in this belief by some observations Claude Bernard made in 1844, 11 years after the publication of Beaumont's monograph. Bernard's well-known experiments, in which the legs of frogs were submerged through a gastrostomy opening in the gastric juice of a dog's stomach, have served to mitigate the earlier serious error of Bernard's deductions concerning the nature of the acid in gastric juice.

Prior to Beaumont, it was generally believed, despite the observations of Réaumur (1752), Stevens (1777), Spallanzani (1785), and Young (1803), that gastric digestion was largely a triturative process, that it was the force of the gizzard in birds and of the gastric antrum in mammals which was largely responsible for the digestion of foods. Beaumont brought forth convincing evidence that gastric digestion was an active chemical process.

However, Beaumont failed to note the presence of an active enzyme in gastric juice. Schwann (1836), a pupil and colleague of Johannes Müller, boiled gastric juice and noted it had no digestive action on food. Schwann rightfully concluded there was an enzyme in gastric juice responsible for digestion, which he called pepsin. Wassman in 1839 elaborated on the observations of Schwann. The historic work of Rudolf Heidenhain (1870, 1878, 1883) of Wroclaw (Breslau), Poland, served to establish the presence of parietal (acid-secret-

From the University of Minnesota Medical Center.
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ing) and chief cells (pepsin-secreting) in the stomach. It remained for Langley (1880-1882) to establish the presence of pepsinogen, the precursor of pepsin.

The linear relationship between enzyme action and temperature has long been known; that cold depresses peptic activity is known to every student of chemistry and biology. However, no special use has been made of this knowledge in the control of pepsin action in gastric digestion.

Assessment of Digestive Power of Gastric Juice

It is almost 20 years (1939) since gastric resection was first employed by one of us (O. H. W.) in the control of idiopathic esophageal stricture,[1] which it is perhaps now safe to label peptic stricture of the esophagus. It soon became apparent that this sensitivity of the esophagus to injury was owing to the circumstance that squamous

Fig. 1.—*Left*, esophagus of cat cooled to 25-30 C perfused with gastric juice cooled to 20 C obtained from patient with duodenal ulcer; results were 1+ to 2+, with little or no effect on esophagus. *Right*, esophagus of control cat at temperature of 37 C perfused with gastric juice at temperature of 37 C from patient with duodenal ulcer; results were 4+ to 5+, with severe esophagitis and perforation.

epithelium does not resist digestion as well as the glandular epithelium of the stomach and upper reaches of the intestinal tract. These observations served to suggest perfusion of the cat's esophagus to assess the potential digestive action of gastric juice. For more than a decade in this clinic, the peptic activity of gastric juice has been determined by observing the damage done to the mucosa of the esophagus of the cat attending perfusion of the esophagus with gastric juice. It is noteworthy that perfusion with gastric juice obtained by overnight gastric aspirations of patients with duodenal ulcer quite regularly causes perforation of the cat's esophagus within a period of two hours when such juice is dripped into it.[2] Moreover, it is the pepsin that is responsible for this action. Hydrochloric acid in the range of the lowest pH levels that can be recovered from the stomach (0.1 *N*) fails to damage the esophageal mucosa noticeably on perfusion. Moreover, there appears to be no influence of temperature, within the physiological range, on the action of hydrochloric acid. When the gastric juice from a patient with duodenal ulcer is cooled and perfused through the esophagus of a cooled cat, the esophagus fails to exhibit evidence of esophagitis or perforation attending perfusion in the warm state (fig. 1).

Effect of Systemic Hypothermia on Gastric Digestion—Fish and Small Animals

After completion of the observations just described, a study was undertaken of the influence of cold on gastric secretion and digestion, employing general and local hypothermia; observations were made on several animal species.[3] The desired levels of hypothermia were attained by reducing the environmental temperature in poikilothermic animals such as the fish, frog, toad, and snake and by brief immersion in ice water in small animals.

Two species of fish, trout (Salmo irideus) and catfish (Ameiurus nebulosus), were studied by measuring the rapidity of the digestion of a test minnow. Digestion of the minnow by a trout kept at 17 C was complete in 8 hours, but at 2 C, 17 hours were required to produce a similar result. The period of time required by catfish for complete digestion of the test minnow was somewhat longer, 16 hours at 20 C and 48 hours at 5 C. Only in fish have we encountered pepsin still active at 2 C.

Similar studies were carried out in frogs, small spring frogs being introduced manually into the stomach of large intact bullfrogs. Digestion of the small frogs in the stomachs of the bullfrogs kept at 26 C was essentially complete in 24 hours, whereas, when the temperature was maintained at 2 C, the spring frog was still alive after 11 hours (fig. 2), dead but intact at 24 hours, and only slightly digested at the end of a week. The digestion of decapitated and pithed frogs under similar circumstances produced equivalent degrees of digestion. The rate of digestion of spring frogs by toads differed only slightly from that reported for the bullfrog, being somewhat faster at 26 C and considerably slower at colder temperatures. The digestion of minnows by bullfrogs and toads maintained at 26 C was complete in 12 to 16 hours, while at 11 C little digestion had taken place after 72 hours.

The digestion of spring frogs by king snakes was also markedly slowed by hypothermia. At 33 C, tissue digestion was complete in 10 hours, while at 7 C, little digestion had occurred after 72 hours.

Studies of digestion in small mammals under general hypothermia were carried out with use of fasted white rats. They were first fed 2 Gm. of lean beef and then either immediately cooled to 20 to 25 C or kept normothermic. It was found that in six hours 98% of the meat was digested by the normothermic rat and only 2% was digested by the hypothermic animals.

Effect of Systemic Hypothermia on Gastric Digestion—Man and Dog

Technique of Achieving Local Gastric Cooling.—Local gastric hypothermia was achieved in man and the dog by circulating a cooling solution (equal parts ethyl alcohol and ice-cold water) through an intragastric balloon. Constant temperature and circulating volume were maintained by a hypothermia machine.

In Vivo Meat Bolus Digestion Studies.—In man, the rate of digestion of a 2-Gm. meat bolus contained in a wide-mesh, gauze sack was measured under normothermic and hypothermic conditions. The meat bolus was ingested by the subject and retained for four hours. It was then retrieved and a new bolus was swallowed and retained for an equal period. During the first four-hour period the intragastric balloon contained fluid at 38 C, while throughout the second four-hour period the cooling solution was circulated through the balloon to keep the stomach hypothermic. In human subjects, the mean weight loss of the bolus during the period of gastric cooling was 18%. In normothermic subjects, the mean weight loss of the bolus was 55%.

Data obtained from similar studies in dogs confirm these findings. The rate of digestion of a 2-Gm. meat bolus by gastric juice was studied in vitro at 37, 20, 11, and 5 C. Aliquots of juice were obtained from dogs with Heidenhain pouches after stimulation with meat, pilocarpine, and histamine. Specimens of unstimulated gastric juice were obtained from patients with duodenal ulcer and gastric ulcer and from those without gastric or duodenal lesions. Weight loss of the meat bolus at 37 C over a period of 10 to 21 hours was between 70 and 80%, while at 11 C the weight loss of the bolus was only 0 to 10%.

Influence of Local Cooling of Stomach on Volume of Gastric Secretion

The effect of hypothermia on the volume of gastric secretion was studied in human and canine subjects. In man, a no. 18 plastic nasogastric tube, connected to a continuous source of suction, was used to collect secretions; in the dog the pylorus was ligated and all secretions were collected by means of a gastrostomy tube. After placement of an intragastric balloon, gastric juice was collected for a two-hour period at normothermic temperatures; thereafter the stomach was cooled and hourly specimens were obtained during the ensuing four hours.

Interpretation of these data shows that the mean reduction in volume of gastric secretion after the initiation of hypothermia was 80% in man and 90% in the dog. Total free acid and total pepsin production were also markedly reduced.

Another experiment afforded lucid proof of the depressant effect of local gastric hypothermia on gastric digestion. An oxygen line, employing a polyethylene tube (no. 90), was fastened with a stitch to a small frog's nose. He was then immersed through a gastrostomy opening into a dog's stomach which was cooled to 4 C. When removed at 36 hours, the little frog, though at first inactive, was still alive and jumped as far as he ever did. His mate, who had been immersed in a warm dog's stomach, even though provided with an oxygen line, was well digested and died within a few hours (fig. 3).

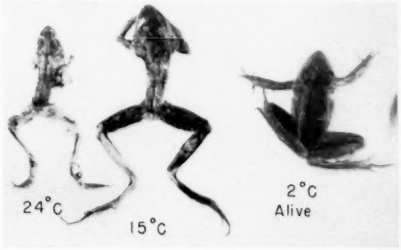

Fig. 2.—Digestion of three small spring frogs kept for six hours in stomachs of bullfrogs shows marked difference in degree. At 24 C spring frog was about 50% digested, at 15 C it was about 20% digested, and at 2 C frog was still alive. At 2 to 4 C small frogs have survived up to 20 hours within a bullfrog's stomach.

Technique of Local Gastric Hypothermia in Control of Massive Gastric Hemorrhage

The foregoing experiments suggested that control of massive gastric hemorrhage might be achieved by use of local gastric cooling.

In a study of the vital statistics of the ulcer problem in Minnesota, Casey [4] found that death from acute massive hemorrhage occurred in 42% of all patients who died from peptic ulcer in that state. In two-thirds of all deaths, hemorrhage played an important role. Emergency surgical treatment of massive upper gastrointestinal hemorrhage also carried with it a formidable mortality. The patients are usually in shock, with markedly reduced blood volumes. The additional stress of surgery is poorly tolerated by such patients. The site of bleeding is often unknown, thereby complicating and prolonging the surgery. The use of any

agency which would make it possible to avoid surgery at such a time would be welcomed by everyone concerned.

Method of Cooling.—The machine now used (fig. 4) to induce gastric hypothermia has been greatly improved over the "homemade" model described in the original report.[3] This machine, while retaining the same basic components, has a number of distinct improvements. The circulation of fluid is constant, without the interruptions formerly necessary to balance inequalities of inflow and outflow. The cooling solution is now pumped out of as well as into the gastric balloon, thus permitting the use of a double-lumen tube of a much smaller over-all diameter. The advantages of automatic shut-off, should the balloon burst, are maintained.

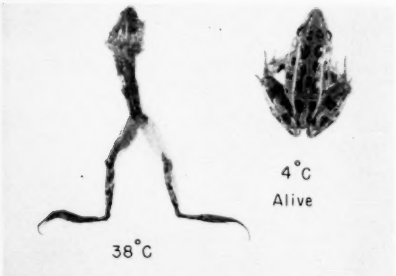

Fig. 3.—Protective effect of hypothermia. Both frogs were provided with an oxygen line by means of small polyethylene tube (no. 90). Frog on left was in normothermic (38 C) dog's stomach for six hours and underwent extensive digestion. Other frog was still alive after 36 hours in normothermic dog because dog's stomach was kept at 4 C by intragastric cooling balloon.

The temperature within the intragastric balloon is maintained at 10 to 14 C by an inflow of 150 to 200 ml. per minute at a temperature of 0 to —5 C. After the balloon has been passed into the patient's stomach, it is filled from a calibrated chamber so that it contains from 800 to 1,000 ml. After this, the fluid is circulated in an entirely closed system. Dial thermometers that register the temperature of the bath and the returning solution are mounted on the control panel, together with switches that control the pump and refrigeration unit. Supervision of the actively bleeding patient after initiation of gastric cooling requires participation of members from the clinical service and the cooling team, as well as nurses. As soon as bleeding appears to be controlled, further cooling may be safely conducted if a special duty nurse is at the bedside and a physician is nearby.

The machine has been in constant operation for periods up to 48 hours. During these runs the components have performed satisfactorily and in almost complete silence.

The Balloon and Its Clinical Use.—The intragastric balloon employed is one of the ordinary 10-cent rubber type, which will stretch to a capacity of about one liter. It is secured to the tubing by several turns of tightly wound 00 silk. The double-lumen tube to which the rubber balloon is attached consists of a no. 320 polyethylene inflow tube that is inserted through the side of the return tube, an 18 or 19 F. thin-walled plastic tube. The inner tube extends a centimeter beyond the end of the outer tube within the balloon. For the treatment of esophageal bleeding a 4-in. soft sheer latex balloon (condom) is attached to the tubing proximal to the gastric balloon. Two inches proximal to the gastric balloon attachment, the outer tube is constricted about the inner tube. Multiple holes bored in the outer tube both proximal and distal to the constricted point are covered by the esophageal balloon. Thus the circulating cold fluid returning from the gastric balloon is forced to flow through the esophageal balloon.

Clinical Safeguards During Cooling

Prior to the insertion of the balloon, the patient's stomach is completely evacuated of all clots by a nasogastric tube or by lavage with an Ewald tube, if deemed necessary. The patient's pharynx is then anesthetized with 5% solution of hexylcaine (Cyclaine) applied topically. Appropriate sedation is given to minimize restlessness and activity.

The empty balloon is wrapped about the end of the tubing, lubricated, and placed into the patient's mouth. The patient swallows this small bolus aided by light pressure on the tubing. Inflation of the balloon in the stomach unfolds the balloon and allows it to distend the stomach very slightly. The low temperature of the tubing minimizes the patient's discomfort. In the main, a tube in the nose is more easily tolerated by the patient than a tube in the mouth. This is an additional reason that we have reduced the diameter of the large tube initially used from 24 F. to a plastic tube corresponding in size to 18 F. In fact, for a child, a polyethylene tube no longer than 12 F. has been used.

A small nasogastric tube also is inserted beside the balloon into the stomach to evacuate blood as it appears and as an aid in evaluating continuance or cessation of bleeding. Frequent measurements of the blood pressure and occasional hemoglobin determinations also help in assessing the patient's response to local gastric cooling.

A constant-reading electronic thermometer registers the patient's temperature by means of an intrarectal thermocouple. The patient's systemic temperature usually remains normal, though external heat is quite regularly applied to insure maintenance of normal body temperature and for the patient's comfort. Mild sedation is continued as needed, and the nasogastric tube is irrigated

frequently. The patient's vital signs are closely followed, and hemoglobin levels are measured every two hours. Transfusions of whole blood are continued until a normal hemoglobin level has been restored.

Despite the presence of the tubes, the alert, wide-awake patient is able to cough effectively and clear his throat of sputum and blood. In the aged, obese, or somnolent patient, regurgitation and aspiration into the tracheobronchial tree can be minimized by doing a prophylactic tracheotomy prior to intubation or soon after cooling is initiated. A semireclining position also helps to lessen the danger of tracheal aspiration. Even in the absence of frank regurgitation, stomach contents are often found in the oropharynx. In a few patients, after the start of gastric hypothermia, a few cubic centimeters of Congo red solution was put into the stomach through the nasogastric tube. The oropharynx was aspirated at regular intervals, and within 15 to 20 minutes Congo red could usually be demonstrated in the aspirated mucus of these patients. It therefore seems advisable to perform a tracheotomy early in all patients whose physical status is poor or wherever there is the slightest indication of a tendency to tracheal aspiration.

When the bleeding has stopped, as judged by the returns from the nasogastric tube and the patient's clinical status and hemoglobin values, cooling is continued only until a normal hemoglobin level is restored. Firm clot formation will usually have occurred in this period in the vessels previously bleeding, and a normal blood volume is restored, thus bringing the patient quickly to an optimal condition to withstand definitive surgical therapy should it prove necessary. The balloon is then deflated and removed. Close observation of the patient is continued, and the further management of the situation can be planned under more favorable circumstances.

Prolonged cooling of the stomach has been carried out in anesthetized animals for 48 hours and in man, up to 125 hours, without any apparent damage to the stomach or to general well-being of the subject. In well over 200 episodes of local gastric cooling on dogs and man the balloons and tubing have functioned satisfactorily without evidence of leaks or obstruction. To maintain the highest degree of safety, balloons and tubing are used only once in clinical cases.

Results of Local Gastric Hypothermia

To the present time, 19 patients with massive unrelenting upper gastrointestinal hemorrhage have been treated by the technique of local gastric hypothermia. In many instances large quantities of blood had been administered prior to the initiation of cooling. Moreover, the majority of these patients were in shock despite rapid transfusion, and hence were in a condition too precarious for emergency operation.

The patients were divided into four major categories according to bleeding site and etiology: (1) duodenum, (2) stomach, (3) esophagus, and (4) miscellaneous.

The results of treatment are as follows (see table):

Duodenal Ulcer.—Nine patients were bleeding from duodenal ulcer. At the institution of gastric cooling, six of the patients were in shock; the mean hemoglobin value was 8.5 Gm. per 100 cc., and an average of 5 units of blood had been infused. Gastric cooling was employed for an average of 15.7 hours. Prompt cessation of hemorrhage occurred in all patients.

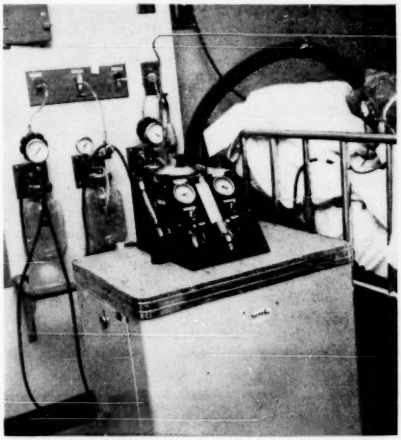

Fig. 4.—Hypothermia machine. Temperature of 10 to 14 C is maintained by pumping in mixture of ethyl alcohol and ice water at —5 to 0 C. Gauges on control panel register temperature.

The coagulation mechanisms in these patients were normal as measured by bleeding, clotting, and prothrombin times. Platelet counts were normal. It was noted that the bleeding stopped in the majority of the cases within three to four hours, as judged by the appearance of decreasing amounts of blood from the nasogastric suction. However, cooling was continued until the hemoglobin levels were returned to normal.

Gastric Ulcer.—There is only one patient with gastric ulcer. This patient, an 80-year-old female with sudden massive hematemesis, was in shock despite a transfusion of 1,000 cc. of blood. Her hemoglobin level was 8.7 Gm. per 100 cc., and her coagulation mechanisms were normal prior to

local gastric hypothermia. Her bleeding stopped soon after initiation of gastric cooling, and a hemoglobin value of 13 Gm. was restored after 20 hours of treatment. No further bleeding occurred.

Esophageal Bleeding.—Three patients with massive hemorrhage from esophageal varices were treated a total of four times. Local gastric and lower esophageal cooling were achieved by the addition of a thin 4-in. latex esophageal balloon proximal to the gastric balloon, as described previously. At the onset of cooling, all of these patients were in shock and had been given an average of 6 units of blood. The mean hemoglobin level was 8 Gm. per 100 cc. Each patient had undergone unsuccessful trials with esophageal tamponade by means of the Sengstaken-Blakemore technique.

rate occasions. The massive hemorrhage was successfully arrested on each occasion by local cooling. She later underwent successful definitive surgical treatment.

These observations would suggest that local gastric cooling should be invoked immediately for the control of hemorrhage from the bleeding esophageal varices of portal hypertension. The observed efficacy of local gastric cooling in the control of the hemorrhage of portal hypertension lends some credence to an earlier thesis that bleeding from esophageal varices was in large measure acid-peptic in nature.[5]

Miscellaneous.—The patients in this group were bleeding from the stomach or duodenum, but unusual circumstances attended the hemorrhagic episodes. These factors were abnormal clotting

Results of Local Gastric Hypothermia in Nineteen Patients with Massive Hematemesis

Lesion	No. of Patients	No. of Times Cooled	Hypothermic Course: Ml. of Blood Prior to Cooling	Hypothermic Course: Coagulation Mechanisms	Hypothermic Course: Shock	Hypothermic Course: Cooling Time, Hr.	Hypothermic Course: Status of Bleeding	Results: Operation Necessary: For Control of Bleeding	Results: Operation Necessary: Delayed, When Condition Stable	Results: No Further Therapy
Duodenal ulcer	9	9			6			0	1	8
Mean			2,500	All		15.7	Ceased in			
Range			500-6,000	normal		5-25	all cases			
Gastric ulcer	1	1	1,000	Normal	1	20.0	Ceased	0	0	1
Esophageal varices										
Intrahepatic obstruction	2	2	1,000 1,000	Abnormal	2	125.0 7.0	Ceased Slowed	1	0	1
Extrahepatic obstruction	1	2	4,500 5,000	Normal	2	17.0 26.0	Ceased	0	1	0
Miscellaneous cases										
Gastric cancer with thrombocytopenia	1	1	9,500	Abnormal	0	24.0	Ceased	0	0	1*
Metastatic cancer (breast) with steroid-induced gastric ulcer	1	1	3,500	Abnormal	1	7.5	Slowed	0	0	1*
Stress-induced duodenal ulcer	1	2	1,000 1,000	Normal	0	28.0 48.0	Ceased	0	0	1
Postoperative bleeding with coagulation defects	2	2	5,500 4,500	Abnormal	2	6.0 22.0	Slowed Slowed	0 1	0 0	1* 1
Gastric erosion with uremia	1	2	4,800 750	Abnormal	1	6.0 13.0	Ceased	0	0	1
Totals	19	23			15			2	2	15

* Patient died before more definitive therapy could be instituted.

Intrahepatic Block (Cirrhosis): The first patient, a 55-year-old alcoholic with severe Laennec's cirrhosis, was bleeding massively from esophageal varices. His hemoglobin level prior to cooling was 11 Gm. per 100 cc. He was treated for five days, with satisfactory control of his bleeding. His hemoglobin value remained normal over this entire period, but he died from liver failure.

The second patient, also with far-advanced alcoholic cirrhosis, was admitted in shock with a hemoglobin level of 8.4 Gm. per 100 cc. Local gastric hypothermia was carried out for seven hours. Although his bleeding was slowed, it was decided to perform transesophageal ligation of his varices. His hemoglobin value at the time of surgery was 13 Gm.

Extrahepatic Block: A 21-year-old girl with congestive splenomegaly (Banti's disease) due to cavernomatous transformation of the portal vein had massive hematemesis with shock on two separate occasions. A marked drop in hemoglobin value, massive hematemesis, and melena characterized these episodes. His bleeding promptly stopped on both occasions after the initiation of local gastric hypothermia.

mechanisms, previous steroid therapy, carcinoma, complications of surgery, and stress.

Carcinoma with Abnormal Clotting Mechanisms: Two patients had disseminated metastatic carcinoma with marked thrombocytopenia, elevated prothrombin times, and prolonged bleeding and clotting times. One patient was bleeding from a gastric carcinoma and the other from a steroid-induced gastric ulcer. Although bleeding in these patients was temporarily controlled, they were not candidates for definitive surgery and recurrent bleeding attended their terminal period.

Stress Ulcer: The stress associated with cervical fracture and resultant quadriplegia evoked massive hemorrhage in a 16-year-old boy on two separate occasions. A marked drop in hemoglobin value, massive hematemesis, and melena characterized these episodes. His bleeding promptly stopped on both occasions after the initiation of local gastric hypothermia.

Bleeding in the Patient After Operation: Two patients bled massively during complicated, prolonged postoperative courses. Both patients were in shock and had received between 8 and 10 units of whole blood replacement prior to cooling. The bleeding in one patient with a platelet count of 18,000 per cubic millimeter and a prolonged bleeding time was slowed. However, she continued to require some blood replacement and therefore operative treatment was elected while her blood volume was near normal.

The other patient had multiple ulcerations of his stomach, duodenum, and esophagus. The hemorrhage was slowed by local gastric hypothermia, but the unrecognized presence of a large firm rubbery clot in the stomach prevented efficient cooling. When the patient died unexpectedly six hours later, the hemoglobin level was 14.6 Gm. per 100 cc. This experience has taught the necessity of evacuating all clots from the stomach prior to the introduction of the cooling balloon.

Gastric Erosion with Uremia: A 13-year-old girl with chronic renal disease, thrombocytopenia, and hypoprothrombinemia had a massive gastrointestinal hemorrhage requiring replacement of 4,000 cc. of blood prior to initiation of local gastric hypothermia. The patient was in shock, with a hemoglobin level of 10 Gm. per 100 cc. Local gastric cooling produced prompt cessation of bleeding, and her vital signs and hemoglobin value stabilized in six hours. Three days later bleeding recurred to a lesser degree; it again was rapidly controlled with use of the same technique. (This patient has recently undergone successfully surgical management of urinary obstruction.)

Comment

The hazard of undertaking emergency operative measures to control hemorrhage is avoided by the employment of gastric cooling, by permitting restoration of blood volume, and by subsequent study to determine the site of bleeding and preparation for future definitive therapy. The experience with this group of cases has been a rewarding one, which has suggested definitely that depression of gastric secretion and peptic activity by local gastric cooling is of merit in the management of massive upper gastrointestinal hemorrhage.

Gastric hypothermia would not appear to be a promising method for the treatment of gastric or juxtagastric bleeding in association with metastatic carcinoma and allied disorders accompanied by low platelet counts and elevated prothrombin times. Similarly, in many postoperative states, attended by gastric hemorrhage and manifestations of deranged clotting mechanisms, local gastric hypothermia cannot be expected to elicit the same dramatic therapeutic responses as occur in peptic ulcer hemorrhage. Moreover, the terminal condition of the patients in this latter category frequently tips the scales in the direction of an unfavorable result. Nevertheless, cessation of bleeding has been achieved in a few patients in this group. A larger series of cases will be required to evaluate the usefulness of hypothermia in the control of esophageal hemorrhage.

Our small experience with local gastric hypothermia is encouraging. The method will need a longer trial in our and other hands to evaluate more precisely its advantages and shortcomings. In hemorrhage from peptic ulcer syndromes, an accurate diagnosis as to the exact site of hemorrhage apparently is not so important, whether it concerns a duodenal or gastric ulcer or hemorrhage from bleeding esophageal varices, though obviously it would be good to have precise information, if possible. Our own limited experience with hemorrhagic dyscrasias, with aberrations in the components essential to the clotting of blood, would suggest that recognition of such abnormalities is important, so that awareness of the need of invoking other therapeutic agencies may be prompt.

Summary

Gastric digestion is retarded considerably by local gastric cooling. With this procedure, a striking decrease in the volume of gastric secretion occurs. Inhibition of peptic activity is the primary cause of the suppression of gastric digestion. Observations with use of systemic cooling were made on the fish, frog, toad, and rat, and observations with local gastric cooling were made in dog and man. Only in fish have we encountered a gastric pepsin fairly active at 2 C. Even so, however, there is a notable retardation of gastric digestion attending systemic cooling in fish (trout and catfish).

Gastric hypothermia inhibits digestion of an intact frog placed in the stomach of a large bullfrog or in the stomach of a dog. In the warm animal, death and digestion of the inhabitant is a rapid and usual sequence. In the cool state, neither digestion nor death occur!

Local gastric cooling has been employed as a therapeutic adjunct in the management of massive gastric hemorrhage. Nine patients with massive hematemesis from actively bleeding duodenal ulcers have been cooled successfully, with cessation of hemorrhage and without recourse to operation. A similar result attended use of local gastric cooling in a patient with massive hemorrhage from a gastric ulcer. Three patients with portal hypertension and massive hemorrhage have been cooled. Cessation of bleeding occurred in two of these and was slowed in the other.

The method has also been used in miscellaneous conditions causing massive hematemesis, including (1) gastric and breast cancers with thrombocytopenia, (2) gastric erosions occasioned by uremia, (3) steroid ulcers with ensuant hemorrhage, and (4)

severe gastric hemorrhage in early convalescence from other surgical procedures. The results in this group have been variable—in some instances, disappointing. In others there has been slowing or cessation of the gastric hemorrhage. Obviously, these conditions do not constitute the best indications for use of local gastric hypothermia in the control of hemorrhage.

These observations suggest definitely that local gastric cooling is of promising therapeutic value in the management of massive hematemesis from peptic-ulcer-linked conditions of the duodenum, stomach, and esophagus.

Addendum

Since this paper was presented, nine additional patients have been subjected to local gastric hypothermia for massive gastric hemorrhage. Two patients had bleeding esophageal varices; the bleeding was controlled and successful definitive surgical therapy was carried out. There were three patients with severe hemorrhage from diffuse gastritis which was successfully controlled; surgical correction was done after adequate blood replacement and supportive therapy. There were two patients with postoperative bleeding which was successfully controlled. One of these, who entered the hospital with a blown-out duodenal stump, a gastriccutaneous fistula, and complete obstruction of both afferent and efferent jejunal loops, ultimately died from peritoneal sepsis. A 4-year-old boy, treated intensively with cortisone for rheumatic fever for six weeks, bled massively twice from a steroid-induced duodenal ulcer. The first episode was quickly controlled. Owing to parental restraint and reluctance to have either local gastric cooling or surgery instituted for the second episode, only a futile last-resort attempt could be made to try to control the hemorrhage when it recurred. Bleeding was also successfully controlled in an 82-year-old woman with massive bleeding from an antral gastric ulcer, which proved, on operation, to be benign.

412 Union St. S. E. (14) (Dr. Wangensteen).

The hypothermia machine used is made by the Swenko Manufacturing Company, Minneapolis.

Just where in Washington Beaumont did his experiments on Alexis St. Martin is not known. We believe they were done at the northeast corner of 10th and E streets, N. W. If anyone has definite knowledge regarding this point, we would appreciate his sending us any information, letters or documents, giving evidence on this matter.

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THE POSTMENOPAUSAL OVARY.—Urinary estrogen and gonadotropin excretion was determined in 51 normal postmenopausal women, 45 to 81 years of age, and in 30 surgically castrated women, 23 to 52 years of age. In the postmenopausal women the menses had ceased from one to thirty-three years previously. Urinary estrogen excretion of the postmenopausal women was approximately twice that of the castrated women. Although there was overlapping, the difference between the values for the 2 groups was highly significant. Estrogen excretion remained constant throughout the postmenopausal years, being the same sixteen to thirty-three years after the menopause as one to five years thereafter. Urinary gonadotropin excretion was elevated in each of the postmenopausal and castrated women. The average value for the ovariectomized women was significantly higher than the average for the postmenopausal women. Urinary gonadotropin excretion of the postmenopausal women showed no tendency to decrease with advancing years. Two postmenopausal women who received hog pituitary FSH responded with increased urinary excretion of estrogen and amelioration of menopausal symptoms. The other 4 postmenopausal women and the 2 castrated patients who received pituitary FSH did not respond. It is concluded that the postmenopausal ovary retains a small but significant secretory function and that it is the major source of postmenopausal production of estrogen.—C. A. Paulsen, M.D.; R. B. Leach, M.D.; H. Sandberg, M.D.; S. Sheinfeld, M.T.; and W. O. Maddock, M.D., Ph.D., Function of the Postmenopausal Ovary. Comparison of Urinary Estrogen and Gonadotropin Excretion and Response to Administration of FSH in Postmenopausal and Ovariectomized Women, *Journal of the American Geriatrics Society*, November, 1958.

THERAPY OF HYPERTENSION WITH ORALLY GIVEN SYROSINGOPINE

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Syrosingopine, a drug derived from reserpine, was administered orally to 77 ambulant patients for the treatment of essential hypertension. Group 1 consisted of 38 patients not previously treated for hypertension. Group 2 consisted of 34 patients who had been maintained on therapy with reserpine, were changed to therapy with syrosingopine, and were maintained on it for an average of three months. Group 3 consisted of five patients on combination drug therapy who had severe mental depression or other symptoms of intolerance when maintained on therapy with older antihypertensive drugs. In group 1, 16 patients (42%) responded with a clinically significant fall in mean blood pressure. In group 2 the blood pressure was controlled without side-effects by individual adjustment of dosage. In group 3 the dosage used (3 mg. of syrosingopine per day) maintained the desired antihypertensive effect without nightmares, nasal congestion, or other significant side-effects.

The effectiveness of Rauwolfia and its derivatives in the therapy of hypertension has been well demonstrated in many studies.[1] In many patients with mild to moderate hypertension, such preparations in appropriate dosage reduce the mean blood pressure 20 mm. Hg or more, and in some the blood pressure may return to normal. In other patients, usually with more marked blood pressure elevations, the Rauwolfia preparations play a useful role in combination drug therapy. The need for continuous therapy is obvious, and tolerance to the preparations after long administration has not been observed.

The limiting factor in the widespread use of Rauwolfia preparations has been the disturbing side-effects. The frequency and severity of these depend on the dosage being used. However, in the dosage range for therapeutic effect, over half of the patients have been noted to complain of such symptoms as drowsiness, terrifying nightmares, depression, nasal congestion, abdominal cramps, gastrointestinal bleeding, fatigue, weakness, dysuria, and impotence.[1b] Fortunately, only a rather small percentage of patients have experienced symptoms so severe that the drug had to be withdrawn, but such ancillary effects may make Rauwolfia therapy unsuitable for long-term administration.[2] Pharmaceutical chemists have been vigorously searching for Rauwolfia derivatives which exhibit less of these undesirable side-effects while retaining antihypertensive potency.

Syrosingopine or carbethoxysyringoyl methylreserpate (Singoserp) is one of the most recently produced synthetic compounds derived from reserpine. It was prepared in the hope of removing the undesirable attributes of the naturally occurring drugs of this class. It has been experimentally shown to be a nontoxic yet active antihypertensive agent in several species of animals, with considerably fewer sedative and gastrointestinal effects than reserpine.[3] Darvill [4] found syrosingopine to be an effective hypotensive agent in clinical studies in 28 patients, practically none of whom experienced significant side-effects.

Methods and Results of Present Study

Over the past nine months, we have studied the effects of syrosingopine administered orally to 77 ambulant patients with essential hypertension at the University of Texas Medical Branch. Patients were generally seen at intervals of twice weekly for two to three weeks for the establishment of baseline levels of blood pressure. The drug was administered in divided doses two to four times daily. At each visit throughout the study, careful clinical evaluation of each patient was made, including repeated blood pressure determinations, usually made while the patient was sitting and after a rest period of one hour. Careful inquiry was made as to possible side-effects. Laboratory studies, such as periodic electrocardiograms, blood cell counts, urinalyses, and blood urea nitrogen level determinations were made on all patients, usually at intervals of two to three weeks. The patients were divided into three groups for purposes of the study.

Group 1.—Group 1 included all patients who had not previously been treated with an antihypertensive agent and who were given syrosingopine as the first such medicament. There were 38 patients with essential hypertension admitted to the cardiovascular clinic on no medication, including 27 females and 11 males. All of the patients were Ne-

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groes except four. Syrosingopine was administered to them in varying dosage. There was an initial control period of at least three to four visits, during which base-line blood pressures were established. Administration of the drug was generally begun at a dosage of 0.25 mg. given four times daily, and at times this was increased at intervals of two weeks to a maximum of 1 mg. four times daily. During this time no additional medicaments were prescribed. The duration of therapy was two to five months, with an average of three months.

TABLE 1.—*Blood Pressure, in Millimeters of Mercury, in Patients in Group 1 Before and During Therapy with Syrosingopine*

Case, No.	Av. Before Therapy	Av. During Therapy, Mg. per Day				Maximum Reduction*	Change in Mean Blood Pressure
		1 (24 Patients)	2 (11 Patients)	3 (11 Patients)	4 (6 Patients)		
1	187/110	...	171/112	...	...	−16/+2	−4
2	186/106	184/98	...	...	...	−2/−8	−6
3	240/130	245/116	...	...	...	+5/−14	−8
4	280/146	200/125	...	...	...	−80/−21	−40
5	179/115	176/112	...	...	...	−3/−3	−3
6	197/120	150/103	...	...	...	−47/−17	−27
7	252/145	168/117	...	...	...	−84/−28	−47
8	168/112	160/100	...	...	...	−8/−12	−11
9	188/120	168/117	...	...	...	−20/−3	−9
10	175/112	192/104	140/97	...	...	−35/−15	−22
11	194/104	170/105	113/100	...	...	−81/−4	−30
12	263/141	...	...	...	250/140	−13/−1	−5
13	195/110	...	...	...	140/70	−55/−40	−45
14	207/127	152/102	170/115	180/124	...	−55/−25	−35
15	180/104	180/105	...	...	...	0/+1	+1
16	201/109	...	160/79	...	...	−41/−30	−34
17	215/110	230/118	...	...	208/100	−7/−10	−9
18	239/142	210/110	210/130	245/130	...	−29/−32	−31
19	180/114	153/103	185/100	157/97	140/80	−46/−34	−38
20	148/114	...	...	167/104	160/100	+12/−14	−5
21	200/116	...	166/104	...	...	−40/−12	−21
22	190/125	...	...	177/120	...	−13/−5	−8
23	224/134	200/132	...	220/130	220/130	−24/−2	−9
24	191/100	175/92	...	175/96	...	−16/−8	−11
25	170/113	174/118	...	...	...	+4/+5	+5
26	207/98	206/100	...	...	...	−1/+2	+2
27	163/101	165/72	...	...	...	+2/−29	−19
28	183/113	...	173/106	...	...	−10/−7	−8
29	210/103	190/102	...	...	...	−20/−1	−7
30	185/116	...	217/118	...	...	+32/+2	+12
31	102/96	...	...	182/85	...	−10/−11	−11
32	201/152	...	...	176/120	...	−85/−32	−59
33	171/119	...	...	185/108	...	+14/−11	−3
34	233/127	200/117	...	...	...	−33/−10	−18
35	160/91	130/87	...	...	...	−30/−4	−13
36	218/116	...	180/92	...	...	−38/−24	−29
37	150/110	...	...	168/97	...	+18/−13	−3
38	170/104	150/97	...	...	...	−20/−7	−11

* Average blood pressure reduction was −23/−12.5.

Table 1 lists the average of the blood pressures during the control period and the period when patients were on various dosage regimens with syrosingopine. There were 11 patients with diastolic blood pressure levels from 91 to 109, 16 with 110 to 119, and 11 with 120 mm. Hg or greater. Six of these patients had an initial blood urea nitrogen level of 25 to 87 mg.%, and these values remained essentially unchanged during the period of therapy.

The average blood pressure for this entire group decreased from a control value of 199.1/116.5 to 176.1/104.0 mm. Hg on the various dosage schedules. The reduction in the mean blood pressure (diastolic pressure plus one-third of pulse pressure) after therapy exceeded 20 mm. Hg in 13 patients, and the diastolic pressure returned to normal in an additional 3, making a total of 16 patients (42%) with significant clinical response. In five patients the diastolic pressure was reduced below 90 mm. Hg. The most dramatic response appeared to occur in the patients with severe essential hypertension with diastolic pressures initially over 120 mm. Hg. Six of 11 such patients showed a drop averaging 38.3 mm. Hg in mean pressure.

In individual patients, it was not possible to correlate a decreasing blood pressure with increasing doses of the drug. In two patients (cases 14 and 18), a satisfactory initial response was followed by an increase in blood pressure despite larger doses of syrosingopine. However, the blood pressures did not rise to the original control levels. This refractoriness may have been due to the progression of their arteriolar disease. Four of the 14 patients on the higher dosage levels of 3 and 4 mg. per day showed significant drops in mean blood pressure (over 20 mm. Hg), or a fall in diastolic pressure to below 90 mm. Hg. Six of 11 patients on the 2 mg. per day regimen showed significant declines in the mean blood pressure. Seven of 24 patients showed significant falls in blood pressure on the lower dosage schedule of 1 mg. per day.

Group 2.—Group 2 consisted of patients with essential hypertension treated with reserpine whose response was studied after change of medicament to syrosingopine. There were 34 patients who had been maintained on reserpine therapy alone for periods of 1 to 12 months in whom syrosingopine in varying dosages was substituted for the older drug. No other change in medicament was made during this period of observation. In a number of patients, syrosingopine was given in gradually increasing doses, with increases being made at two-week intervals. Recorded blood pressures were discarded for the first two weeks after cessation of reserpine therapy in order to avoid residual reserpine effects. Follow-up studies on patients on syrosingopine therapy were done for one to nine months (average three months).

Table 2 summarizes the therapeutic results observed in this group. The average blood pressure determination is given for each patient at various dosage levels of reserpine therapy. The right half of the table lists the average changes in blood pressure during treatment with various doses of syrosingopine. The average change on the dose of 1 mg. per day of syrosingopine in 24 patients was an increase in pressure of 0.1 mm. Hg systolic and 0.9 diastolic. There were three patients (cases 59,

65, and 70) with increases in mean pressures greater than 20 mm. Hg after being changed to 1 mg. per day of syrosingopine from previous reserpine dosages of 1 mg. per day in two patients and 0.5 mg. per day in one. One (case 40) showed a temporary decrease in mean arterial pressure of 20 mm. Hg. On the syrosingopine dosage of 2 mg. per day, 12 of these patients had an average increase in blood pressure of 2.3/1.0 mm. Hg. One patient (case 46) showed a significant increase of 32 mm. Hg in mean blood pressure, while another (case 69) showed a significant decrease of 27 mm. Hg in mean blood pressure. In six of these patients who received 3 mg. per day of syrosingopine, there was an increase in average blood pressure of 5.3/0.4 mm. Hg. One of these patients (case 59) had a significant increase of mean blood pressure of 22 mm. Hg. On the syrosingopine dosage of 4 mg. per day in six patients, there was an average decrease in systolic pressure of 1.7 mm. Hg and decrease in diastolic pressure of 3.7 mm. Hg. One patient (case 59) had a significant increase in mean blood pressure of 22 mm. Hg; two others (cases 49 and 61) had significant decreases of mean blood pressure of 31 and 21 mm. Hg.

TABLE 2.–*Blood Pressure, in Millimeters of Mercury, in Patients in Group 2 During Therapy with Reserpine and Syrosingopine*

	Av. on Reserpine, Mg. per Day			Av. Change on Syrosingopine, Mg. per Day			
Case No.	0.5 (11 Patients)	0.75 (4 Patients)	1.0 (19 Patients)	1 (24 Patients)	2 (12 Patients)	3 (8 Patients)	4 (6 Patients)
39	205/110	...	...	−12/+8	...	...	...
40	...	...	234/128	−24/−18	−24/+2	+11/+2	...
41	...	...	180/123	...	...	−3/−3	...
42	...	...	167/122	...	...	...	0/−1
43	...	169/102	...	...	+24/−2	...	...
44	...	...	227/125	...	−10/−7	...	...
45	...	...	160/102	−6/+4	−14/−4	...	...
46	157/100	...	...	+8/−28	+69/+18	...	...
47	137/99	...	...	+33/+6	+36/+1	...	...
48	190/102	...	...	0/0	...	...	...
49	177/108	...	...	−24/−7	+8/−8	−20/−11	−37/−28
50	...	...	171/111	−18/−8	...	...	...
51	...	...	174/118	−2/−16	...	...	...
52	166/84	...	...	...	...	...	+16/+4
53	179/105	...	...	...	−6/+1	...	...
54	...	...	227/123	+33/+7	...	...	...
55	...	...	146/102	...	...	+21/+2	+14/−2
56	...	...	190/110	−14/−16	...	−15/−14	...
57	...	...	182/116	+18/+1	...	...	...
58	...	165/115	...	...	...	−1/0	...
59	200/105	...	...	0/+27	...	+20/+25	+20/+25
60	...	...	145/86	+2/+8	...	...	...
61	...	231/128	...	−1/−10	...	...	−23/−20
62	...	...	192/80	...	0/−1	...	...
63	...	...	160/100	...	+15/+8	...	...
64	...	...	200/112	−15/+4	...	...	...
65	...	...	166/106	+34/+19	...	...	...
66	...	...	175/106	−25/−3	...	...	...
67	175/109	...	...	−7/+8	...	...	...
68	...	180/110	...	0/0	...	...	...
69	178/108	...	...	−8/−3	−65/−8	...	...
70	...	...	140/70	+45/+45	...	...	...
71	...	...	167/103	−15/−1	+3/+12	+34/+2	...
72	180/105	...	...	0/−5	...	...	...
Av.	176.73/103.18	186.25/113.75	180.89/107.52	+0.1/+0.9	+2.3/+1.0	+5.3/+0.4	−1.7/−3.7

Group 3.–Group 3 consisted of patients with severe essential hypertension on combination drug therapy who were conspicuously intolerant of Rauwolfia products. Five patients with severe hypertension on multiple antihypertensive therapy (Rauwolfia, chlorothiazide, hydralazine, and ganglionic blocking agents) were unable to continue an effective regimen because of severe intolerance to the older alkaloids. The symptoms consisted of severe mental depression in two patients and nasal congestion in three. In these five patients, attempts were made to change from one to another of the various Rauwolfia preparations (the crude derivative, reserpine, rescinnamine, and alseroxylon), but no such changes proved effective in lessening the side-effects. When Rauwolfia derivatives were deleted from the therapy, there was clearing of the side-effects but the blood pressure rose. Syrosingopine therapy in doses of 3 mg. per day was substituted for the previous Rauwolfia agents in these five patients, with as effective antihypertensive action as on the previous regimen and without significant side-effects.

Side-effects

In addition to the cases described in group 3, above, there were nine patients in group 2 who had experienced severe side-effects related to reserpine therapy. These consisted of severe and distressing nasal congestion in eight, with abdominal cramps and loose stools in one of these, and night-

mares in one additional patient. The reserpine dosage on which these symptoms developed was 1 mg. per day in six and 0.5 mg. per day in three. Therapy in these patients was changed to that with syrosingopine in doses increasing to the point at which follow-up blood pressure determinations were essentially similar to those during reserpine therapy. The dosage of syrosingopine required to accomplish this was 1 mg. per day in three patients, 2 mg. per day in two, 3 mg. per day in two, and 4 mg. per day in two. Side-effects persisted in only three of these patients receiving dosages of syrosingopine of 2, 3, and 4 mg. per day. Nasal congestion persisted in one patient, nightmares in another, and abdominal cramps with nasal congestion in a third. In the latter patient, the symptoms of drug intolerance disappeared when the syrosingopine dosage was reduced from 2 mg. to 0.5 mg. per day, while the previous effective blood pressure reduction was maintained at the lower dosage.

No patients developed side-reactions with syrosingopine who had previously tolerated reserpine. Of the 38 patients in group 1, who did not receive reserpine, only one (case 4) developed a side-effect from syrosingopine. This consisted of nightmares which occurred when dosage of 1 mg. per day was given. There was good reduction of blood pressure in this instance, and therapy did not have to be discontinued as the side-effect was easily tolerated.

Pulse rates before and after the administration of syrosingopine showed no constant change, although there was considerable variation in individual patients over the time they were observed. The prominent bradycardia usually accompanying reserpine therapy was not seen. The drug appeared to produce little or no effect on the alertness of the patients, and there was no definite tendency to develop drowsiness or depression. Follow-up observations on blood cell counts and urinalyses in our patients showed no toxic hematological or renal effects. No gastrointestinal symptoms were noted except in the one patient previously discussed, who developed abdominal cramping on both reserpine and syrosingopine therapy. There was no instance of gastrointestinal bleeding.

Comment

It would appear from our studies in previously untreated hypertensive patients that syrosingopine is moderately effective as an antihypertensive drug. A significant blood pressure reduction was obtained in 16 (42%) of the patients treated with this drug alone, and in 5 of these the diastolic pressure was reduced to normal levels. These figures are roughly comparable to those observed with other types of Rauwolfia therapy. In general, patients who had been treated with reserpine could be given syrosingopine with maintenance of similar blood pressure reduction. The required dosage of syrosingopine appears to be higher than that of reserpine, but the drug is well tolerated in all dosage ranges tested.

The chief advantage of syrosingopine over other Rauwolfia derivatives seems to us to be the relative infrequency with which it produces disturbing side-effects. In our entire group of 77 patients, 14 of whom were markedly intolerant to one or several of the older Rauwolfia preparations, we observed side-effects due to syrosingopine in only four. In many hypertensive patients, the psychic and bradycardic effects of the established alkaloids may be desired; in such patients those drugs would still seem to be indicated. However, syrosingopine seems to offer a distinct advantage over the other preparations where such effects are to be avoided or when troublesome side-reactions limit their use as antihypertensive agents.

Summary

A clinical study made of syrosingopine therapy in 77 ambulant patients with essential hypertension demonstrated this agent to be effective in reducing hypertension, although the daily dosage required is higher than that of reserpine. Severe side-effects are infrequent, and this attribute of syrosingopine is its chief advantage over other Rauwolfia preparations. The drug appears useful in the management of patients with essential hypertension.

Addendum

Since this paper was submitted, we have observed a striking result of syrosingopine in a 45-year-old hypertensive man with recurrent angina at night precipitated by disturbing nightmares. Substitution of syrosingopine, 1.0 mg. per day, for the previously administered reserpine, 0.5 mg. per day, abolished the dreams and the angina. The blood pressure remained at its reduced level.

The syrosingopine used in this study was supplied as Singoserp (Su-3118) by Ciba Pharmaceutical Products Inc., Summit, N. J.

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APPLICATION OF ABDOMINAL PRESSURE FOR ARTIFICIAL RESPIRATION

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A method of providing long-term respiratory assistance by intermittent abdominal pressure was tested in 15 patients with respiratory paralysis of different degrees of severity. Effective artificial respiration was provided by means of rhythmic inflation of a rubber bladder incorporated in an abdominal corset. A positive displacement pump powered by line current or 24-volt battery connects to the respirator by means of a flexible plastic base. Active assisted expiration is followed by passive inspiration due to gravitational pull on the diaphragm. Ventilation improves progressively as the trunk is flexed from 30 degrees to an optimal angle of 75 degrees above the horizontal. It was not necessary to exceed pressure of 50 cm. of H_2O at 16 cycles per minute in any patient. This method increased the range of physical activities and improved vocational potentialities for those needing life-long respiratory assistance after they have had poliomyelitis.

The rehabilitation program and daily activities of patients with residual respiratory paralysis after having poliomyelitis are often limited by the types of respiratory aids now generally available. This is true despite the fact that virtually every patient, no matter how severely affected, is now emancipated from the tank respirator at least for several hours daily. The introduction of the cuirass type of respirator has greatly increased the mobility of the patient with respiratory paralysis. The rocking bed has made it possible for many patients to sleep in comfort and to enjoy relative freedom from mechanical devices during the day. Positive pressure respirators applied by mouthpiece or trachea tube have also afforded many advantages, particularly during exercise programs and to facilitate nursing care.

Each of these devices, however, has its distinct disadvantages and interferes in one way or the other with activity. The rocking bed is only slightly less restricting than the tank, since it confines the patient to one place and limits his activity while the bed is in motion. The chest-abdomen and chest cuirass respirators are bulky and conspicuous, permit little trunk motion, and interfere with the use of upper extremities in work on tables or wheel chair trays. Intermittent positive pressure respirators require the use of cumbersome hoses, and, if mouthpieces are used, they interfere with conversation, mouth wand activities, and eating. (The mouth wand is used for activities such as page turning, typing, operation of microswitches and special telephones, and painting with oils.) The need for some type of respiratory assistive apparatus which would permit maximum breathing for activities, including work at a desk, led to the perfection of the new device to be described here.

Intermittent Abdominal Pressure Respirator

The intermittent abdominal pressure respirator (Pneumobelt), hereafter referred to as IAPR, differs in principle from the conventional devices used in the United States. It produces artificial respiration by assisting expiration rather than inspiration. It consists of an elastic inflatable flat bladder incorporated within an abdominal corset (fig. 1). As the bladder inflates the abdominal wall is compressed, the diaphragm rises, and expiration occurs; when the bladder deflates the abdominal contents and diaphragm fall as a result of gravitational pull and inspiration occurs passively. Three different corset sizes (12 in., 10 in., or 8 in. long), together with adjustable straps and movable buckles, enable satisfactory fitting to various abdominal girths and lengths. The bladder may be easily removed from or inserted into the belt. The corset is constructed of washable, preshrunk cloth and with minor adjustments of the clothing may be worn under ordinary street attire.

Cyclic inflation of the IAPR is provided by a specially constructed respirator pump (Multilung), with use of a flexible, lightweight, plastic hose connection. The respirator consists of a double-acting positive displacement piston unit driven by a 24-volt, DC-geared motor. The pump is designed to provide three types of respiratory assistance: (1) intermittent positive pressure to the airway, (2) intermittent negative pressure with cuirass respirator (the pump is of sufficient capacity to provide ventilation in patients using all sizes of chest respirators and sizes A and B [Technicon-Huxley] chest-abdomen cuirass respirators), and (3) intermittent positive pressure to the abdominal wall (fig. 2 and 3). It can also deliver intermittent positive pressure (via tracheostomy, naso-oral mask, or mouthpiece)

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simultaneously with negative pressure (chest cuirass respirator), or it can provide positive pressure (via tracheostomy, naso-oral mask, or mouthpiece) synchronously but in inverse phase with positive

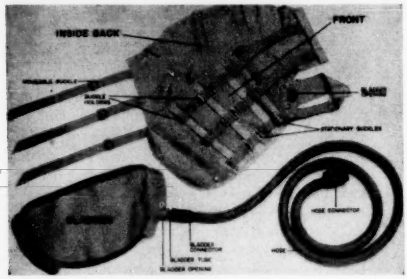

Fig. 1.—Intermittent abdominal pressure respirator: inflatable bladder and abdominal corset.

pressure to the abdomen via the IAPR. The inspiratory phase of the IAPR is arbitrarily fixed at 40% of the respiratory cycle and the expiratory phase at 60%.

A 24-volt storage battery in a case complete with charger, charger timer, and safety fuses is provided with the unit. This battery will operate the pump

Fig. 2.—Intermittent abdominal pressure respirator with respirator pump, providing intermittent positive pressure to abdominal wall.

for about eight hours when fully charged. The power unit contains its own rectifier so that it may be operated on 110-volt AC from a standard home utility outlet without additional accessories. Its size allows convenient placement between the rear wheels of a wheel chair. The power unit and battery charger are mounted on a small aluminum caster carrier which permits easy portability of the two parts as a unit (fig. 4). Special features of the power unit include an alarm system for power failure, respiratory rate control, independent pressure controls, a pressure safety valve, and a special intake tube to allow humidification or administration of aerosols or noninflammable gas mixtures through the positive pressure outlet for mask or tracheostomy. When the line electric current is discontinued there is automatic switchover to battery and automatic switchback to line current on its resumption. The pump can be operated manually with a hand crank on failure of line and battery current.

Fig. 3.—Intermittent positive pressure supplied to abdominal wall.

Testing the Respirator

Evaluation of the effectiveness of the IAPR as a method of artificial respiration was made on 15 adult subjects with paralysis of respiratory musculature due to poliomyelitis (see table).

All subjects used mechanical respiratory aids for variable periods during the day. Only three subjects had vital capacities of over 1,000 ml. Preliminary observations were also made on the use of the IAPR in the treatment of patients with pulmonary emphysema.

Subjects in a semireclining position on a stationary rocking bed were fitted with the IAPR if necessary while using positive pressure from the pump. The IAPR was then cyclically activated and the pressure gradually raised until the patient stated tidal exchange was sufficient and he was able to discard the mouth positive unit. Ventilation measurements, with use of the 9-liter Collins spirometer, were made with the patient's trunk inclined to sev-

eral angles with respect to the horizontal plane and at several pressure settings for each angle. All subjects were instructed to relax as much as possible in order to permit the IAPR to take over the work of breathing. Whenever possible, arbitrary IAPR pressures of 20, 30, 40, 50, and 60 cm. H_2O and trunk angles of 30, 40, 60, and 75 degrees were selected for ventilation measurements. Eight to 10 respiratory cycles were measured, and averages were determined for each pressure and angle. Measurements were discarded as unreliable if there was more than 10% variation of tidal volume in these 8-10 cycles.

Effectiveness of Intermittent Abdominal Pressure Respirator in Fifteen Patients

Case No.	Sex	Age, Yr.	Time Since Onset, Mo.	Height, In.	Weight, Lb.	Vital Capacity, Ml.	Required* Daytime Tidal Volume, Ml.	Minimum Required† IAPR Pressure, Cm. H_2O
1	M	19	12	71	100	50	320	48
2	F	27	15	66	100	300	315	30
3	M	30	48	65	145	325	430	49
4	F	23	36	66	130	375	340	50
5	F	32	6	66	90	400	280	39‡
6	M	36	13	72	153	410	450	27
7	F	30	3	65	94	450	290	27
8	M	32	6	71	103	500	365	19‡
9	F	21	60	61	100	600	310	42
10	M	48	13	71	140	640	420	28
11	M	26	13	72	140	700	430	17
12	F	25	25	68	168	800	420	38
13	M	34	5	73	125	1,100	410	18
14	M	35	36	73	130	1,250	400	28
15	M	27	10	65	129	1,450	400	27

* At 16 breaths per minute.
† To achieve tidal volume in 75-degree sitting position.
‡ 60-degree sitting position.

As previously mentioned, the IAPR is incorporated in three different corset sizes to enable fitting different body builds. This study did not specifically investigate ventilation differences produced by the different corset sizes in individual subjects. Choice of corset size used is based largely on the subject's build and his comfort. In general, the large size fits adult males; the medium, adult females; and the small, children. Two points regarding application of the corset deserve consideration: If the corset is applied too snugly or too loosely the IAPR loses effectiveness. Trial and error application is necessary to find the precise tightness which produces both optimal ventilation and comfort for the subject. The corset is designed with a convex lower border (to fit the suprapubic area) and a horizontal upper border. It should be applied with its upper border approximately at the level of the xiphoid in order to insure enclosure of the lower portion of the rib cage. Preliminary studies in some subjects revealed a tendency to paradoxical expansion of the chest with application of abdominal pressure. This tendency was found to be minimized by enclosure of the lower thorax by the corset.

Results of Testing

Relation of Tidal Volume to IAPR Pressure.—Figure 5 shows data obtained from three subjects in a 75-degree sitting position at various IAPR pressures. Good correlation is obtained between the pressures applied at the belt bladder and the tidal volumes measured. All other subjects showed a similar roughly linear correlation between the IAPR pressure and tidal exchange. It was noted, however, that there was marked variation from subject to subject in the absolute tidal volumes obtained at the same IAPR pressures as well as in the slope of the lines relating tidal volume to pressure. The range of variation in the "compliance" values derived from the tidal volume pressure grafts was from 3 ml. of tidal volume per cubic centimeter of water rise in IAPR pressure to approximately 90 ml. per cubic centimeter of water pressure. The reasons for the wide variation in compliance from patient to patient are probably numerous. Incomplete relaxation of subjects with unconscious resistance or assistance to air flow may be an important factor. It is recognized that valid measurements of tidal exchange could probably be made only with the patient completely under curarization. This was not feasible in this study. However, in order to minimize errors due to variation in the degree of relaxation of each subject, measurements were considered reliable only if there were little variation in the 8 to 10 tidal volumes recorded for each IAPR pressure and bed angle. Other factors concerned, in addition to pulmonary and thoracic cage compliance, may be variation in effective abdominal length and compliance of the diaphragm, abdominal wall, and related structures.[1]

Fig. 4.—Easy portability of respirator unit.

Pressures of 50 cm. H_2O and below were uniformly comfortably tolerated. Pressures above 70 cm. H_2O usually made the patient uncomfortable. No subject was encountered who did not achieve an adequate tidal exchange at a pressure of 50 cm.

H_2O in the 75-degree sitting position. All subjects could, of course, undergo hyperventilation if pressures higher than those necessary to achieve adequate tidal volumes were used. The table shows the minimum IAPR pressure required for each subject

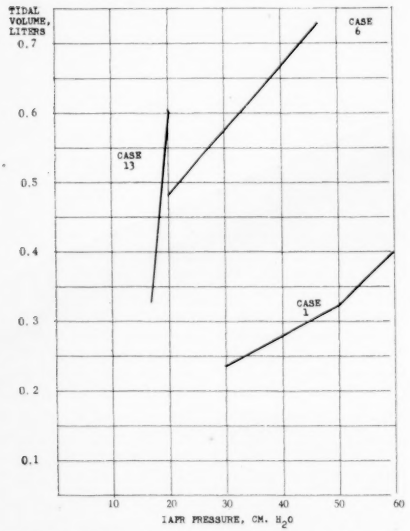

Fig. 5.—Tidal volume and required pressures in three subjects using intermittent abdominal pressure respirator.

to achieve an adequate tidal volume in the 75-degree sitting position. (Required tidal volumes were estimated from the Radford nomogram at a respiratory rate of 16 per minute.[2])

Relation Between Tidal Volume and Angle of Trunk with Respect to Horizontal Plane.—Figure 6 shows the data obtained from a 25-year-old quadriplegic woman (case 12, see table) with a vital capacity of 800 ml. Tidal volume is shown at four different angles of the trunk with respect to the horizontal plane. It can be seen that tidal exchange is progressively improved as the subject moves from the semireclining to the sitting position. All subjects showed a roughly similar increase in tidal volume with progressive increase in body inclination from the horizontal to the vertical position. In general, the IAPR proved inadequate to move sufficient air with the subject supine. Under the conditions of measurement, inspiration is passive and dependent on the action of gravity on the abdominal contents and diaphragm. Therefore, the IAPR would not be expected to function with the subject recumbent. While one subject has been able to use the IAPR for comfortable sleeping at a reclining angle of 15 degrees, in most subjects 25 to 30 degrees is the minimal angle at which adequate ventilation can be achieved.

Comment

Use of IAPR in Rehabilitation Program.—In the rehabilitation of the patient with respiratory paralysis during the past decade emphasis has changed from a goal of freedom from respiratory aid to one of safe, maximum function.[3] This has been made possible by provision of the patient with severe paralysis with the precise amount of respiratory assistance necessary for the various activities of daily living. The IAPR has been found to be a valuable adjunct to the cuirass and positive pressure respirators in permitting this type of patient to pursue an active exercise program without developing hypoxia. We consider this device to be the respirator of choice for such activities as stair-climbing (fig. 4) and those exercises, especially of the upper extremities, best performed with the subject in the sitting position. It is also the most acceptable respiratory aid for patients who can use it for vocational activities in the sitting or standing positions.

Some patients with pronounced trunk weakness require specially designed, tailor-made body corsets in which the IAPR bladder may be simply incorporated. It may be of interest that, on at least one occasion (in work done by Dr. B. C. Kriete at the Respiratory Center of Goldwater Memorial Hospital, Welfare Island, N. Y.), the IAPR bladder has

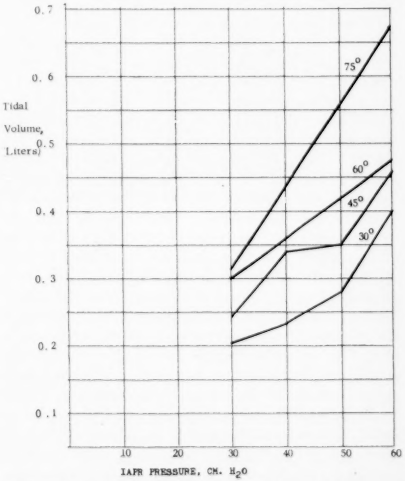

Fig. 6 (case 12).—Tidal volume and required pressures at four angles of trunk.

been placed under the plaster-of-Paris body jacket of a patient with scoliosis and the patient was successfully given ventilation while the cast had to be worn.

Use of IAPR in Nonparalytic Pulmonary Diseases.—At the present time the IAPR is used principally for long-term respiratory assistance of patients with

respiratory paralysis due to poliomyelitis. Although it has been recognized that increased work of breathing plays an important part in the pathogenesis of respiratory acidosis due to chronic pulmonary disease, few workers have used prolonged respiratory assistance with mechanical respirators to relieve the work of breathing.[4] Preliminary observations on the use of the IAPR in three patients with respiratory acidosis due to chronic pulmonary emphysema have impressed us with the value of this device for such a purpose. Since pulmonary emphysema is associated with increased functional residual capacity and expiratory difficulty, it would seem that correction of the pathomechanics would be aided more by use of IAPR than by the more commonly employed positive pressure breathing devices. Further work is in progress to document these impressions and to delineate the place of this respirator in the over-all management of patients with this disease.

Summary and Conclusions

A new mechanical respirator, operating on the principle of assisted expiration through intermittent abdominal pressure, has proved effective as a ventilatory aid in a group of 15 patients with respiratory paralysis. Adequate ventilation of all subjects was accomplished with less than 50 cm. H_2O applied to the abdomen with the subjects in a sitting position. Ventilation rose progessively as the subjects' trunks were raised from the recumbent to the sitting position and, similarly, as the abdominal pressure was increased. The respirator has been found to be a valuable adjunct to other respiratory aids in permitting rehabilitation activities without hypoxia. For some activities it is the respirator of choice. Preliminary observations in patients with pulmonary emphysema suggest that this new respirator may have a definite place in the over-all management of this disease.

Fairmont Hospital of Alameda County, Foothill Boulevard (Dr. Lewis).

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The test equipment used in this study was supplied by Conitech, Ltd., Chauncey, N. Y.

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COLD ADAPTATION.—The natives who volunteered for the tests were all young males of the Pitjandjara tribe of the arid, semi-desert country of central Australia. Around the native settlement at Areyonga they wore clothing, usually shirt and trousers and, sometimes, boots. They informed us through the superintendent, who spoke their language, that usually they removed their clothing at night, using it as a pillow, and invariably they did this while out hunting. . . . We were here interested in analyzing the response of natives and ourselves sleeping "proper bush", i.e. nude between fires in the native way. The natives were therefore asked to arrange the windbreak and fires for the night according to their accustomed manner. The men then stripped and lay down either singly or back to back between the fires. They took care of stoking the fires themselves and this occurred some 3-10 times during the night. They lay motionless between stokings and apparently slept well, frequently snoring. . . . The metabolic and thermal response was investigated by measuring oxygen consumption and rectal, skin and environmental temperatures throughout the night. . . . The great heating of the skin towards the fire and the considerable cooling towards the shadow, i.e. the sky or another man, are very striking. Skin temperatures were regularly found to be lower in the natives than in the whites. . . . Natives sleeping 'proper bush' and stoking the fires at their own volition often had skin temperatures in the shadows as low as 12-15°C and, facing the fire, sometimes exceeding 45°C. . . . Such temperatures, which must be regarded as of normal occurrence in the natives, are painful to white men. In contrast, measurements in our own regular sleeping gear showed that all our skin temperatures, including that of the foot, remained above 33°C throughout the night. With a much greater latitude of tolerance to chilling and relatively few interruptions for fire tending, the native can rest and sleep through cold nights.—P. F. Scholander, H. T. Hammel, J. S. Hart, D. H. LeMessurier, and J. Steen, Cold Adaptation in Australian Aborigines, *Journal of Applied Physiology*, September, 1958.

CLINICAL NOTES

SHORT DISTANCE RADIO TELEMETERING OF PHYSIOLOGICAL INFORMATION

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and
Harold G. Beenken, E.E., Omaha

Current development of transistors and electronic circuitry provides an opportunity for further advances in the development of portable equipment for studying physiological function in ambulant and working subjects.[1] With encouragement, about four years ago we began the design of a portable transmitting and recording system. Objectives were as follows: the transmitter should be compact and not over 2 lb. in weight; the system should transmit the frequencies encountered in most physiological studies, i. e., 0 to 1,000 cps; the system should transmit and record more than one channel simultaneously; the transmitter should transmit all channels requiring only the addition of suitable transducers and preamplifiers for the various types of physiological information desired; and the system should be operable by persons without radio engineering experience. Electrocardiographic transmission was selected for the first design because it represents an important band of physiological frequencies and we were familiar with the circuit problems. We wish to describe here the present model. Electronic details will be described elsewhere.[2]

After a number of preliminary assemblies a system was constructed transmitting at 540 kilocycles per second. The weight was over 2 lb. because of the necessity of using vacuum tubes in several stages requiring filament and high-voltage batteries. A study of Federal Communications Commission (FCC) data showed that the 540-kilocycle region had a high noise level in such buildings as hospitals and that this noise level was too high for reliable operation under the FCC low-power radiation rule. In 1954 it was not obvious how rapidly transistors would improve, but by 1956 noise levels were down, greater uniformity in production was being achieved, and operation was successful in megacycle ranges. The advantages of operation in the megacycle range are great. At 100,000,000 cps, equipment components would be smaller and battery consumption much less, there would be the advantage of using frequency modulation for transmission, and the design of a multichannel assembly would be simplified.

From the Cardiovascular Service, Department of Internal Medicine, University of Nebraska College of Medicine.

Transmitting System

Figure 1 shows a block diagram of the transmitting system. The patient is connected to the electrocardiogram preamplifier by means of three electrodes properly placed to get the desired recording. The electrode signals 2 to 3 mv. maximum with an average of 6,000 ohms source impedance and is amplified by the electrocardiogram preamplifier to such a level that the 3-mv. signal results in 90 to 95% amplitude modulation of audio frequency. The audio oscillator is tuned to the carrier frequency of the channel involved. In this unit it is 2,100 cps. Design considerations are for multichannel operation, up to a maximum of 10 channels. The carrier frequencies of the first six channels are 600, 1,350, 2,100, 2,850, 3,600, and 4,350 cps. These channels will have a band width of 170 cps at the 1-db. points, 250 cps at the 3-db. points, and 275 cps at the 6-db. points. The next four channels will have nominal band widths of 1,000 cps each. The exact carrier frequencies of these four channels have not been determined but will be between 6,000 and 15,000 cps. The amplitude modulation of the audio frequency also takes place in this block.

The amplitude modulation (AM) signal is then amplified in the next block to proper power level to frequency modulate the following stage. AM signals from other channels will be combined in this stage.

The last block in the transmitting system includes the radio frequency oscillator oscillating at 104 megacycles per second and the circuitry for fre-

quency modulation (FM) of this frequency with the combined AM signals from the channels.

The system of AM-FM is being used. FM of the radio frequency was chosen because of its inherent advantages over AM in signal to noise ratio and

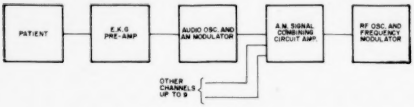

Fig. 1.—Block diagram of transmitting system.

because the field of transistors has developed enough to allow operation at the very high frequencies where FM is desirable. Double side band AM of the audio channel frequency is used because a simple detector can be used without supplying a demodulating frequency that has to be kept at the same frequency as the channel frequency. Small drifts of the channel frequency do no harm as long as the frequency is satisfactorily inside the pass band of the receive band pass filter.

A block diagram of the receiving system is shown in figure 2. The receiving antenna is a four-element beam with a driven element, reflector, and two directors. The FM receiver can be any good receiver covering the frequency band involved.

The output of the receiver is impedance matched by means of an L pad, if required, to the 600 ohm input of the band pass filters. The channels are separated by means of these receive band pass filters. One receive band pass filter is used for one-channel operation, two for two-channel operation, etc. The output of the receive band pass filter is connected to a conventional diode detector. The output of the detector is connected to a low pass filter. This low pass filter passes the desired detected intelligence from direct current to 300 cps and attenuates audio carrier frequencies and harmonics

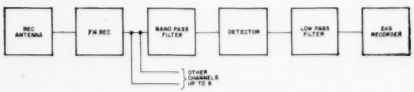

Fig. 2.—Block diagram of receiving system.

due to detection by more than 50 db. The output of the low pass filter is terminated in its characteristic impedance of 10,000 ohms and can be connected to almost any recorder of greater than 10,000 ohms input resistance and greater sensitivity than 1 volt full scale. Other recorders could possibly be used with proper circuit matching pads. In electrocardiogram transmission, enough loss is inserted in the receive circuit so that a conventional electrocardiogram recorder can be used.

Miniaturization of the transmitting system has been accomplished to the extent that no large circuit components are required. The power supply requirements are very low because the transmitter is completely transistorized. Our test model used mostly standard-size circuit components as a convenience in making changes dictated by test results. Use of miniature and subminiature components and assemblies would greatly reduce the size of the system. Figure 3 shows the single-channel electrocardiogram model. Battery current for the preamplifier and audio oscillator is approximately 2

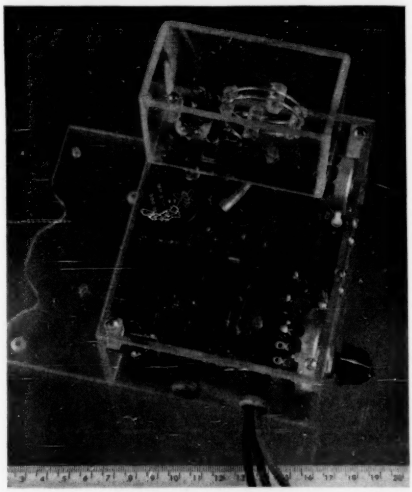

Fig. 3.—Complete transmitter with single channel for electrocardiogram transmission, with band width of 250 cycles and time constant of 4 seconds operating at AM carrier frequency of 2,100 cps and FM frequency of 104 megacycles per second.

ma. and for the radio frequency circuit 3 ma. Battery life is approximately 100 hours. An antenna was not used. To be nondirectional, an antenna would have to extend several feet above the head. Aside from being conspicuous it would interfere with walking through doorways. Radiation is obtained direct from the tuned oscillator circuit, i. e., two turns 1¼-in. diameter of no. 14 tinned wire, which can be seen in figure 3. This provides a transmitter which is essentially nondirectional,

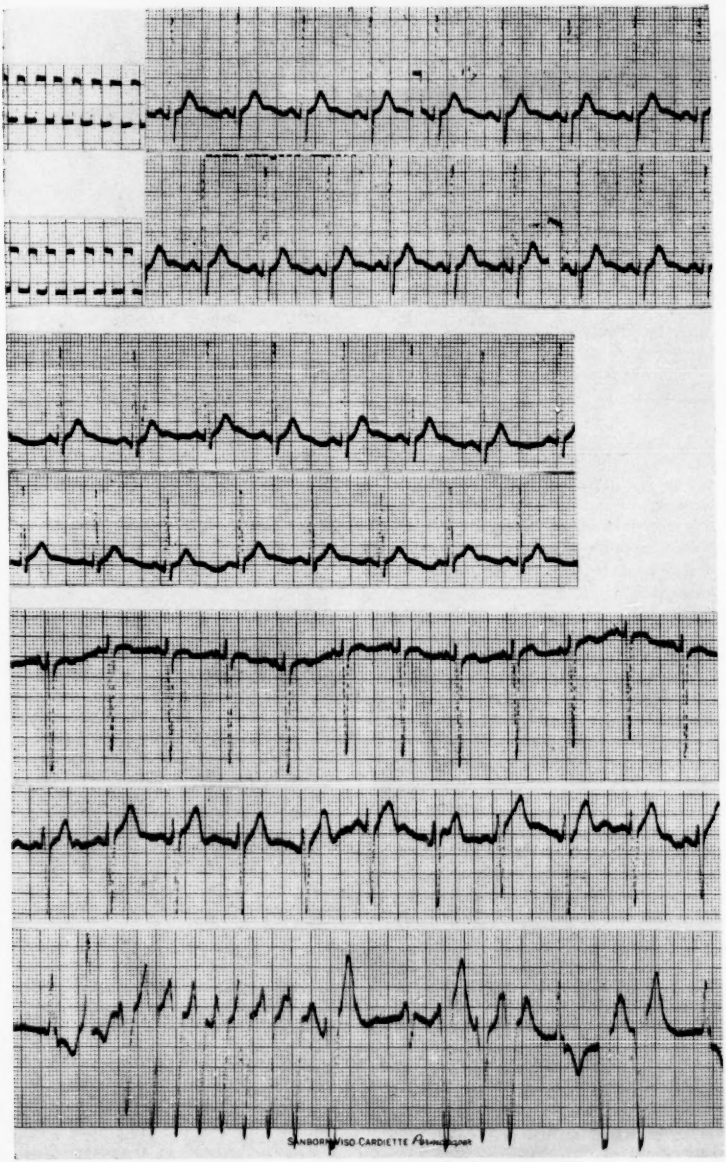

Fig. 4.—*Top tracing*, standardization, 1 mv., and electrocardiogram from direct-writing electrocardiograph. *Second tracing*, standardization and electrocardiogram from same subject with use of radio transmitter and recorded by same electrocardiograph. *Third tracing*, transmitter 100 ft. from receiver, fastened to subject's back, which was toward receiver. *Fourth tracing*, subject facing receiver. *Fifth tracing*, subject walking in corridor. *Sixth tracing*, subject walking on treadmill. *Seventh tracing*, short run of ventricular tachycardia while subject was walking on treadmill.

and calibration is maintained over the working distance. Operating distance is about 200 ft. indoors and over 500 ft. outdoors. Larger transistors, which should be available to us soon, will increase the working distance to a half mile, which appears to be a maximum for projects presently contemplated. The transmitter is stable in operation, does not require any field adjustments, and is not affected by shaking. During construction the transmitter was tested and adjusted for uniformity of operation over the range of 70 to 90 F. The electrocardiogram preamplifier works satisfactorily over the range of 60 to 106 F.

The one-channel model reported here was used for electrocardiogram transmission. This meant that the preamplifier had to amplify signals of 0.1 to 3 mv. in the presence of skin potentials of a possible amplitude of 50 to 100 mv., have a time constant of 4 seconds, have at least 200,000 ohms input impedance, maintain a steady base line, and have adequate rejection of inphase signals.[3]

Clinical Use

Figure 4 shows samples of records. A calibrating signal of 1 mv. is provided in the preamplifier. Transmission of records is without loss of fidelity, and the time constant of 4 seconds is sufficient to transmit the slower changes in the electrocardiogram without loss of amplitude.[3] Tracings 3 and 4, taken with the subject standing 100 ft. from the receiver, show that position does not affect fidelity of the transmission. Tracings 5 and 6 were taken with the subjects walking in the hall and on a treadmill. The front electrode is in V_3 position, and the back electrode is at the same level and ½ in. to the right of the midline. Tracing 7 shows the sudden onset of a ventricular tachycardia in a young man. The immediate recording permitted diagnosis and cessation of the exercise promptly before his severe type of attack developed.

By the use of available transducers and the construction of proper preamplifiers, the transmitting system can be applied to counting, temperature, pressure curves, curves requiring base-line stability and calibration, and electrical and mechanical sensing. A few of the applications that have been discussed are as follows: electrocardiograph monitoring of exercise tests; combination of two electrocardiograms to produce a vector that will give maximum sensitivity to T-wave changes as an index of anoxia during exercise testing; electrocardiogram monitoring during conferences where strain patterns are introduced; rectal temperature and/or electrocardiogram in a tractor operator working in a field; electroencephalographic monitoring in ward or conference; electromyographic or myographic multichannel recording for diagnosis or for study of phases of coordination in retraining; pressure measurements from various locations of the foot and shoe during walking; and monitoring electrocardiograms in operating or recovery room without connecting wires.

Several other features should be mentioned. Modern medical practice often utilizes formidable masses of instrumentation both in the ward and in the operating room. The stability and ease of operation of this transmitter offers the possibility of eliminating a few of the wires draped around the subject and at the same time notably reduces possible explosion hazards due to the very low voltages used and the completeness of shielding possible. This isolation of the transmitter makes it much less susceptible to stray fields, artifacts, and noise.

Summary

A completely transistorized radio transmitter and receiving system operates at 104 megacycles per second. The weight is under 2 lb., without the use of miniature parts. Design is for transmission of up to 10 channels with band widths of 150 to 1,000 cps. The channel reported has a carrier frequency of 2,100 cps and was tested for electrocardiographic recording. Satisfactory calibrated records were obtained with subjects walking and on the treadmill.

University of Nebraska College of Medicine, 42nd and Dewey Avenue (5) (Dr. Dunn).

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Ronald D. Loch supplied technical assistance in this study.

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CORTICOSTEROID TREATMENT OF TRANSFUSION REACTION FROM INCOMPATIBLE BLOOD OF ABO TYPE

REPORT OF A CASE

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Blood transfusions have become commonplace in the practice of medicine; mortality from them is approximately the same as mortality from appendectomies. Some reactions do occur, however, for various reasons, and their treatment requires prompt recognition of the type of reaction and immediate therapy. Transfusion reactions are of four types: pyrogenic, manifested by fever, chilly sensations, nausea, vomiting, and headache; allergic, manifested by urticaria and sometimes wheezing; reaction to the plasma of the blood, manifested by chills, fever, and muscular pains but no hemolysis; and finally the dreaded hemolytic reaction which is sometimes fatal.[1]

The hemolytic reaction is an antigen-antibody reaction due to blood group incompatibilities. It begins suddenly, soon after the transfusion is started. The patient becomes restless and complains of back pain, chills, fever, nausea, vomiting, and precordial oppression. The condition may progress rapidly into shock. Hemoglobinemia and hemoglobinuria appear almost immediately. Impairment of renal function usually ensues, and the patient most frequently dies from this cause. A fatal bleeding tendency may also develop.

The treatment of the patient with hemolytic reaction has heretofore consisted primarily in stopping the blood transfusion and instituting supportive measures to protect the kidney and to treat the eventual lower nephron nephrosis. Antibiotics are indicated to combat infection which may increase the breakdown of protein, and electrolytes must be carefully balanced. In spite of the fact that there are many reports of the effectiveness of ACTH and cortisone in the treatment of acquired hemolytic anemia [2] or hemolytic disease of the fetus and newborn (erythroblastosis fetalis),[3] there have been few reports in the literature of the use of these agents in the treatment of patients with transfusion reaction. The report of a patient so treated follows.

A 57-year-old woman underwent repair of a cystocele and rectocele and excision of the cervical stump on Aug. 6, 1957. She was discharged from the hospital on Aug. 15 in good condition. Shortly after going home she began to bleed slightly. On Aug. 21 she bled profusely and was readmitted to the hospital in a state of shock. Her hemoglobin level was 8 Gm. per 100 cc. She was given a transfusion on the morning of admission, without reaction, but continued to bleed slightly. She was given another transfusion on the evening of admission and again there were no ill-effects.

On the morning of Aug. 22, at 10:20 a.m., another transfusion was begun. Almost immediately she began to complain of not feeling well. The rate of transfusion was slowed. The patient complained of nausea and aching and had a severe shaking chill. Her temperature reached 103.4 F. (29.6 C). The transfusion was stopped at 10:55 a.m. after almost 200 cc. had been given. A check on the blood showed that she had received type A blood and her blood was type O, Rh positive. Through a laboratory error, the wrong bottle of blood had been given her. Within one-half hour after the start of the transfusion her blood pressure had dropped to 70/50 mm. Hg from 110/60. She had a backache and was in critical condition. ACTH, 40 units in 1,000 cc. of 5% glucose in water, was started intravenously. She was also given 100 mg. of hydrocortisone sodium succinate (Solu-Cortef) intravenously and 50 mg. of cortisone intramuscularly. Intramuscular cortisone therapy was maintained in full dosages as well as ACTH gel.

Frequent laboratory studies were done on the patient. Urinalysis on Aug. 23, 1957, showed a faint trace of albumin and six to eight white blood cells per high-power field, but there were no red blood cells and no evidence of hemoglobinuria. Results of van den Bergh's test remained normal throughout. Repeated urinalyses and blood studies showed no evidence of hemolysis. Her urea nitrogen level rose slightly from 18 mg. per 100 cc. on Aug. 22 to 25 mg. per 100 cc. on Aug. 27. Her blood cell count rose steadily from a hemoglobin concentration of 8.8 Gm. and 2,700,000 erythrocytes per 100 cc. on Aug. 24 to 10 Gm. of hemoglobin and 3,340,000 erythrocytes on Sept. 2. By Sept. 2, her urea nitrogen level had dropped to 16 mg. per 100 cc. Her urine at times showed a few red blood cells and a few white blood cells but a Foley catheter was in place during this time and some of these may have been due to irritation. The patient had a good volume of urine throughout this time. She recovered and has remained well.

Summary

The literature contains many reports of the effectiveness of ACTH and cortisone in the treatment of hemolytic anemias of the acquired type or Rh incompatibilities. Corticosteroid therapy has been effective in the treatment of patients with hemolytic disease of the fetus and newborn (erythroblastosis fetalis); there are a number of reports of prevention of this disease in utero by administration of corticosteroids to the mother.[3b]

In a case of transfusion reaction ACTH and cortisone apparently blocked the hemolysis expected from an incompatible blood transfusion. Administration of corticosteroids in these medical emergencies should be added to the present program of treatment.

432 Badgerow Bldg. (1).

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SPONTANEOUS HEMOPNEUMOTHORAX IN A HEMOPHILIAC

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and
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Despite the diversity of hemorrhagic complications encountered in patients with hemophilia, bleeding within the chest is uncommon. In 1943, review of the early literature by Freedman and associates [1] revealed only two cases of hemorrhagic disease complicated by hemothorax; neither patient was a hemophiliac. These authors reported a 22-year-old man with a familial history and laboratory studies characteristic of hemophilia, whose spontaneous hemothorax was treated successfully by repeated thoracenteses and "numerous small transfusions." A similar case had been reported by Pendergrass and Neuhauser [2] the year before. In 1957, Kay and Kupfer [3] reported a spontaneous hemothorax in a proved hemophiliac successfully treated by thoracenteses and infusions of antihemophilic globulin.

In 1953, in the Polish literature, Juszczynski [4] reported a stab wound of the chest successfully treated by thoracotomy in a presumed hemophiliac. The response of this patient to stored bank blood suggests that this was actually a case of Christmas disease and not classic hemophilia.

In a search of the literature, no previous case of spontaneous hemopneumothorax complicating hemophilia was found. Since the management of the mechanical problems of a pneumothorax complicated by intrapleural bleeding in a hemophiliac has not to our knowledge been discussed in the literature, it seems worthwhile to present the following case report.

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Report of a Case

A 27-year-old man entered the emergency ward of the Massachusetts General Hospital, Boston, at 9 p.m. on July 25, 1957, shortly after the onset of left thorax and arm pain which developed while he was getting out of an automobile.

Physical examination on admission showed an acutely dyspneic, well-developed young man with a left pneumothorax. X-ray examination of the chest on admission showed 75% collapse of the left lung and a small amount of fluid at the base. Thoracentesis in the second anterior interspace was performed, with removal of 1,500 cc. of air under slight positive pressure. This procedure completely relieved the patient's dyspnea. Physical examination showed reexpansion of the left lung.

During the night his dyspnea returned. Physical examination again revealed a left pneumothorax with shift of the mediastinum to the right and fluid at the left base. Aspiration of 1,500 cc. of air from his chest was done, and near normal breath sounds returned and his dyspnea disappeared.

On admission a history suggestive of hemophilia had been given, and an infusion of fresh frozen plasma was begun. At this time his hemoglobin level was 15.5 Gm.%, white blood cell count 8,300 per cubic millimeter with a normal differential, bleeding time 7 minutes,[5] and clotting time 16 minutes.[6] The number of platelets appeared normal on the smear. Stool guaiac examination and urinalysis gave negative results.

By morning he again began to feel short of breath, and x-ray examination showed a total collapse of the left lung with fluid present to the level of the sixth interspace posteriorly and a shift of the mediastinum to the right. Because of the continued signs of tension, a catheter was placed through the eighth interspace in the posterior axillary line under 10 cm. of water negative pressure. Aspiration of 1,000 cc. of blood was done. There was a moderate pulmonary air leak, as judged by the steady aspiration of air from the chest. Laboratory studies showed a hemoglobin level of 15.0 Gm.%, platelet count of 343,000 per cubic millimeter,[7] normal clot retraction with no lysis, prothrombin time 100%,[8] and prothrombin consumption 84%.[10] However, at

the time these tests were done he had received 300 cc. of fresh frozen plasma and 500 cc. of fresh blood.

The patient had bled easily after minor trauma since childhood. A tonsillectomy at the age of 7 years was followed by profuse hemorrhage requiring packing and transfusion. A subsequent tooth extraction and a cheek laceration had each required transfusion. He had been studied in 1937 at the Boston City Hospital, where a diagnosis of hemophilia had been made. His maternal grandfather was a "bleeder" and had died of hemorrhage. His brother had also bled severely after minor lacerations. There was no history of abnormal bleeding in his mother or other members of the immediate family.

Despite catheter drainage the lung remained completely collapsed. A second catheter was placed in the second anterior interspace in the midclavicular line the evening of the first day. During the first 24 hours 3,000 cc. of blood was drained from his chest tube and there was evidence of a continued pulmonary air leak. During this period he had been on a regimen of 100 cc. of fresh frozen plasma per hour, quantitative replacement of blood loss by fresh blood transfusions, and administration of Vitamin K, ascorbic acid, and antibiotics. Although his clotting time was normal, he continued to bleed. In the second 24 hours 2,500 cc. of blood was drained from his chest despite replacement with fresh blood and fresh frozen plasma. Treatment with 120 mg. of prednisone in four divided doses was begun. X-ray examination showed the mediastinum to be shifted to the right and his lung totally collapsed despite the two catheters.

On the third hospital day the bleeding, as measured by the chest catheter drainage, slowed and by the fourth day had stopped. The fresh frozen plasma infusion was reduced to 100 cc. every three hours, and the upper tube was removed. On the sixth day he was comfortable. Clotting time was three and one-half minutes. The remaining catheter was removed. The amount of fresh frozen plasma given was reduced to 500 ml. per day.

On the ninth day purulent drainage from the lower catheter wound appeared, his temperature rose to 103 F (39.4 C), and it was apparent that he had an empyema. Culture showed Staphylococcus pyogenes var. aureus sensitive to chloramphenicol (Chloromycetin) and erythromycin. Treatment with this combination of antibiotics controlled the systemic infection, and the empyema drained spontaneously through the previous stab wound in the lower left chest. He was discharged on Aug. 27, 1957, with a chronic draining empyema.

He was readmitted on Sept. 7, 1957, because of persistence of fever, weight loss, and malaise. A catheter was inserted into the left chest, but adequate drainage could not be established. Rib resection, which had been previously rejected because of the danger of bleeding, was now elected. In order to be sure that bleeding could be controlled, a test incision was made through the superficial tissue down to the eighth rib in the postaxillary line after 800 cc. of fresh frozen plasma had been given. This was closed, and postoperative bleeding was not a problem. On the following day a 4-cm. segment of the eighth rib was excised by reopening the test incision after a second priming dose of 800 cc. of fresh frozen plasma. Free open drainage of the left thorax was established. Over the next two weeks his temperature declined, although his general status was unimproved, and he was sent home on Oct. 18, 1957, for convalescence.

In the succeeding six weeks he continued to lose weight and to run a low-grade fever at home; he was admitted on Nov. 29, 1957, for reevaluation. On admission there was marked muscle atrophy of the left chest. He appeared chronically ill and wasted. There was a bronchopleurocutaneous fistula. Culture of the empyema drainage showed Staph. pyogenes var. aureus and Bacillus pyocyaneus. The left lung was collapsed, and there was marked thickening of the parietal and visceral pleura by x-ray. Laboratory studies showed the following findings: hemoglobin level 11 Gm.%, white blood cell count 13,000 per cubic millimeter, platelets 627,000 per cubic millimeter, clotting time 20 minutes, one-stage prothrombin time 100%, prothrombin consumption 75%, thromboplastin generation 25%,[11] antihemophilic globulin level 40%,[12] Christmas factor level 80%, factor V level 120%,[14] factor VII level 50%,[15] and fibrinogen level 400 mg. %.[16] His clotting defect was readily corrected in vitro by the addition of fresh normal plasma but not by the addition of plasma from a patient with classic hemophilia.

Because of his progressive downhill course and bronchopleurocutaneous fistula, it was felt that early death was inevitable unless the septic process could be controlled. Conservative measures, which had been previously elected because of his bleeding defect, had failed and it appeared that only decortication, reexpansion of the lung, and closure of the fistula would reverse the decline.

Since coagulation studies showed him to have a relatively mild degree of hemophilia and the surgically induced bleeding during the rib resection for drainage of his empyema had been easily controlled, it was felt probable that his bleeding disorder could be managed with fresh frozen plasma.

In preparation for operation he was given 800 cc. of fresh frozen plasma during the induction of anesthesia. This raised his thromboplastin generation, antihemophilic globulin level, and Christmas factor level each to 100% of normal. A visceral and parietal decortication with good expansion of the lung was carried out through a left lateral thoracotomy in the fifth interspace. The bronchopleural fistula was found in the posterior segment of the upper lobe, where dense adhesions held the atelectatic segment to the chest wall. This was easily closed. Bleeding was meticulously controlled with fine ligatures where possible and with the electrocautery on surfaces where ligatures could not be used. Bleeding during the procedure was not excessive, and all losses were immediately replaced with fresh whole blood.

He received 2,000 cc. of fresh blood the day of operation. In the first two postoperative days his chest tubes drained 1,800 cc. of blood, which was replaced with transfusions of fresh blood. In addition, he received 100 cc. of fresh frozen plasma per hour. By the third day his hemoglobin level was 9 Gm.%. He received an additional 1,200 cc. of fresh blood. It appeared that he was accumulating a large, clotted, left hemothorax. The mediastinum shifted to the right and the chest catheters ceased to drain. He became dyspneic, and by the fifth postoperative day his respiratory status had become so precarious that the incision in the left side of the chest was reopened with the patient under cyclopropane anesthesia and 2,300 cc. of clotted blood was evacuated. No specific bleeding point could be identified. While the chest was being closed, heart action suddenly ceased. Manual systole was immediately instituted with resumption of normal sinus rhythm after a minute of massage. The incision was then closed, whereupon he developed ventricular fibrillation. Electrical defibrillation was performed, but manual systole for 1 hour and 48 minutes failed to restore spontaneous heart action.

Comment

The hazards of major operations in patients with hemophilia have been emphasized by Craddock and co-workers [17] and MacFarlane and associates [18] and need not be reiterated here. In the reported case, even though the clotting disorder as assessed in the laboratory was mild, major operation was

not performed until it was evident that the patient would surely die without it. Despite the fact that the laboratory tests indicated that the hematological defect was corrected by the administration of fresh frozen plasma and fresh whole blood, it is obvious that adequate hemostasis was not achieved by their administration, even in the doses used.

The treatment of tension pneumothorax was complicated here by the hemorrhagic disorder. Multiple needle aspirations of the chest, which are least likely to cause further bleeding in a hemophiliac, were inadequate to restore a negative intrapleural pressure in this case because of the persistent pulmonary air leak. The immediate respiratory problem was solved by trocar thoracotomy and constant suction. The bleeding was controlled by massive doses of fresh frozen plasma. Prednisone was also used, but its contribution is difficult to evaluate.

The patient's recovery was shortly interrupted by the development of a bronchopleural fistula and an empyema. Because of the persistence of these, despite rib resection and drainage, and because the bleeding defect as measured in the laboratory could be corrected by giving the patient fresh frozen plasma, closure of the fistula and reexpansion of the lung by decortication were elected.

The unavailability of concentrated antihemophilic globulin from animal or human sources led us to use fresh blood and fresh frozen plasma as replacement therapy. The inadequacy of these agents in major hemorrhage has been described by others [18] and was demonstrated by this patient during his early hospitalization and in the period after thoracotomy. It appears that the replacement measures used here can control bleeding in minor procedures, such as trocar thoracotomy or rib resection for empyema drainage. Even in large doses, fresh frozen plasma and fresh blood are inadequate, however, to manage hemophilia in surgery of the magnitude of pulmonary decortication.

It is also apparent that assessment of the level of antihemophilic globulin by the thromboplastin generation test may be deceptive in gauging the severity and likelihood of hemorrhagic complications in hemophilia. A suggestion of the general efficiency of hematological control in minor operations may be gained by a test incision while giving antihemophilic therapy. A precise prediction of the patient's ability to undergo a major operation, however, may be impossible at the present time.

Summary

A case of spontaneous hemopneumothorax occurred in a patient with classic hemophilia. Minor operations—trocar thoracotomy and rib resection—were successfully performed with the use of fresh frozen plasma. The inadequacy of using such conventional replacement therapy for an operation of the magnitude of pulmonary decortication is evident. Preoperative assessment of the operative risk in hemophiliacs by present techniques may be unreliable.

Dr. Joseph McGovern of the Children's Medical Service performed the clotting studies reported.

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COMMITTEE ON COSMETICS

Report to the Committee

The persistent trend toward the incorporation of pharmacologically active ingredients into cosmetics has caused growing concern among the medical profession. One example of this tendency is evident in the increasing interest among cosmetic manufacturers in the possible applications and sales potential of the incorporation of antibiotics into cosmetics. Medical experience provides considerable evidence of the health implications in the widespread, prolonged, or indiscriminate use of antibiotics. Therefore, the Committee has authorized the publication of the following report on the inclusion of antibiotics in products intended for nontherapeutic purposes. VERONICA LUCEY CONLEY, PH.D., *Secretary.*

INCLUSION OF ANTIBIOTICS IN COSMETIC PREPARATIONS

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and
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There seems to be essential agreement that antibiotics generally useful in the treatment of systemic infections should not be used in cosmetics. The risk of sensitization of cosmetic users to such antibiotics could be dangerous. Moreover, and perhaps even more important, the widespread use of cosmetics containing these antibiotics would be unwise because of the possible increased incidence of acquired microbial resistance to such drugs. Therefore, under no circumstances should the antibiotics used in cosmetics include agents of this type.

It has been proposed that agents such as bacitracin, neomycin, polymyxin, and tyrothricin be permitted in cosmetic preparations. Through their use, antimicrobial action would be secured against a wide spectrum of micro-organisms, and the antibiotics used would rarely be required later on for the treatment of systemic infections.

At the present time, the foregoing antibiotics seem to have a relatively low potential for sensitization when applied to the skin. By and large, they are believed not to be potent sensitizers or irritants. Nevertheless, it is not unreasonable to assume that the frequency of sensitization and/or irritation might increase if these agents were applied indiscriminately over a prolonged period of time in an ever-mounting number of individuals. Their use in cosmetics would certainly augment the number of people at risk. By the same token, the time and duration of exposure would inevitably be increased because cosmetics may be applied one or more times each day. We do not have sufficient evidence at this point to state categorically that these compounds cause very little irritation or sensitization of the skin. As time goes on and as the use of these antibiotics becomes more widespread, we may expect that more instances of allergic contact dermatitis, as well as other forms of sensitization and irritation due to these agents, will be reported. Evidence that this may be so is already contained in publications by Baer and Ludwig,[1] Epstein,[2] Sidi, Hincky, and Longueville,[3] and others, including our own observations of isolated cases of allergic contact dermatitis due to neomycin and streptomycin.

In addition, few data are available on the possible toxic effects of bacitracin, polymyxin B, neomycin, and tyrothricin after absorption through the skin. All of these antibiotics are known nephrotoxins. Before they can be legitimately used in cosmetics, evidence should be accumulated to indicate that their prolonged and widespread use on the skin will, in fact, not produce toxic effects of any sort. The burden of proof that such toxicity does not exist rests with those who would include these agents in cosmetics.

Development of Microbial Resistance

A third point at issue in this matter is the possibility that the indiscriminate use of these antibiotics may induce the development of microbial resistance to these agents. Although in vitro studies have indicated that the development of bacterial resistance to these antibiotics is not common, this

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fact should not produce a false sense of security regarding their indiscriminate use. The major result of the widespread use of these antibiotics may be expected to be the elimination of the more sensitive bacterial flora and its replacement by one that is resistant to the action of these agents.

An example of the evidence of this effect can be found in the experience of one of our own institutions. Data accumulated at the Presbyterian Hospital in New York City during the past few years showed an increase in the proportion of antibiotic-resistant micro-organisms isolated from cutaneous infections acquired by the ward population. At the same time, similar infections seen in the outpatient departments of the hospital showed no analogous increase in antibiotic-resistant isolates. Since there was little evidence to indicate that the hospital ward infections were caused by micro-organisms that developed resistance to antibiotics during the patients' hospital stay, the presumption was that these infections were caused by antibiotic-resistant organisms, mainly because their antibiotic-susceptible competitors had been eliminated from the hospital ward environment. It seems, therefore, that the widespread use of antibiotics within a hospital is associated with a disappearance of antibiotic-susceptible organisms, and the strains that remain to produce infections are those that probably were inherently resistant to antibiotics from the beginning. In this connection, it is of interest that the increased percentage of antibiotic-resistant strains of bacteria isolated in the laboratories of Presbyterian Hospital in recent years correlates closely with the increasing extent to which the various antibiotics have been used in the hospital during this period of time.

Although such findings do not conclusively prove that extensive usage is the main factor concerned in changes in resistance of skin bacteria to antibiotics, the inference is that, as antibiotics are used over longer periods of time and with a larger population at risk, the microbial flora found in the environment of that population will be made up more and more of strains of micro-organisms inherently resistant to the antibiotics. Under these conditions, antibiotic-susceptible strains will tend to be eliminated, and it makes little practical difference whether the resistant replacements left free to cause troublesome infections are those that acquire resistance to the antibiotics by their own devices or are those that survive because they are inherently resistant to these agents.

Insofar as we know, there is also no evidence that constant degerming of the skin (except to reduce axillary odors), such as would presumably occur with the widespread use of antibiotics in cosmetics, is necessarily always or even frequently desirable. Evidence has already been presented to show that the widespread topical use of neomycin may increase the number of patients who develop moniliasis as a complication of their therapy.[4] Those who would include such antibiotics as bacitracin, tyrothricin, neomycin, and polymyxin in cosmetics should be prepared to show that their widespread use would not result in an increased incidence of infections due to micro-organisms that are resistant to these agents. Except for the deodorant action of such agents in reducing axillary odors, their incorporation in cosmetics has not been proved to be of specific value, and their widespread use in cosmetics could well represent an increased risk to general public health as well as to certain hypersensitive individuals.

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ADVANTAGES OF GIVING UP SMOKING.—The main advantages of not smoking were wisely summed up by Lord Morton of Henryton in a letter to The Times ten years ago. He had been a heavy smoker for 35 years. . . . His motive in writing to The Times was not to set forth anti-smoking propaganda, but merely to console people who felt they could no longer afford to smoke. . . . "He who gives up smoking will find," he wrote, "that (1) his general health steadily improves; (2) he plays his favorite game with greater skill and less fatigue; (3) his enjoyment of food and drink is keener; (4) his sense of smell is more acute—this has its disadvantages, but the advantages outweigh them; (5) he no longer has that tiresome cough and his mouth feels cleaner; (6) he saves a lot of money; (7) he has a joyous feeling of independence while others are seeking for cigarettes and matches; (8) he enjoys plays and concerts more because he is not longing for a smoke."—J. H. Doggart, M.D., Smoking as a Factor in Visual Disturbance, *The Practitioner*, February, 1959.

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ORIGIN OF THE TERM "INTERNAL MEDICINE"

GUEST EDITORIAL

Arthur L. Bloomfield, M.D.

RECENTLY Keefer [1] and Rhoads [2] discussed the origin and meaning of the term "internal medicine." They did not bring out, however, what was well known at the turn of the century when German medicine dominated American medical thought, that "internal medicine" is simply a translation of the German *innere Medizin*. We must therefore seek the meaning of the term internal medicine by ferreting out the origin of the German *innere Medizin*.

In looking over the important German treatises on medicine one finds that until the last quarter of the 19th century they were all designated as textbooks of pathology and therapy without any suggestion of the words internal medicine. Felix Niemeyer, in his "Lehrbuch der speciellen Pathologie und Therapie" (Berlin, 1859), says "One will readily discover everywhere [in the book] the scientific striving to apply the newer physiology to the explanation of the pathological and therapeutic facts, and to deduce the symptoms of the illnesses as a necessary consequence." The concept of "internal" medicine was, however, not yet emphasized. Ten years later, in the preface of Niemeyer's seventh edition, Berlin, 1868, there was still no mention of "internal medicine."

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But 15 years later the title of Adolf Strümpell's "Lehrbuch der speciellen Pathologie und Therapie der inneren Krankheiten (Leipzig, 1883) has added "of internal diseases," and in the preface he declares that he has tried to bring out "the established facts with reference to internal diseases." What, then, is meant by "internal disease"? All branches of surgery are obviously excluded and the term is clearly used in contrast to external disease, namely, disorders of the skin. Much was made in Germany of dermatology at this time, as witness the numerous treatises of four or more volumes dealing with the subject. Because of the frequent skin lesions of syphilis the dermatologist included syphilis in his domain, and thence extended it to venereal disease in general. There was therefore much for him to do. All this, however, was excluded from the *innere Krankheiten* in distinction to the external diseases—dermatology. It was of course only a short step from internal diseases to the generic term internal medicine and from this to internist as a designation for him who practiced internal medicine.

By 1882 the term was in common use in Germany. So the transactions of the first congress of internal medicine are entitled without further comment "Verhandlungen des Congresses für innere Medicin" (Wiesbaden, 1882). The important journal, *Centralblatt für klinische Medicin* which first appeared in 1881, suddenly changed its name in 1894 to *Centralblatt für innere Medicin*. In the first number of this volume the editor states that this change was made to do away with the misunderstanding that the journal dealt only with purely clinical matters. He said, "our purpose is to give a survey of everything which the world-literature offers in the domain of 'internal medicine.'" Apropos of this point of view J. von Mering in his textbook of internal medicine, "Lehrbuch der inneren Medizin" (Jena, 1901), says "The domain of internal medicine has by the accretion of the most various experimental disciplines reached such a scope that one man can no longer be fully authoritative in all its branches. Only the investigator is competent to critically sift the endless accumulation of detail so that the best can be offered to students and general practitioners." So quite early there was applied to internal medicine a wider concept than that of the simple clinical description of disease; the physiological and chemical basis was included. This concept of "internal medicine" was repeatedly stated by the Germans. The preface to Mohr and Staehelin's monumental "Handbuch der inneren Medizin" (Berlin, 1911) opens as follows: "This book is built up above all on a pathologic-physiological basis." In the second edition (1925) they said "our leading thought is to present 'internal medicine' even more thoroughly on a pathologic-physiologic basis."

It is clear then how the concept of "internal medicine" developed in Germany so as to comprise nonsurgical diseases, exclusive of dermatology; the term also implied a scientific attitude quite different from that of the *practischen Arzt*, the general doctor.

In tracing the use of the term in the United States, one must remember the immense influence of German medicine on ours before World War I. Doctors in huge numbers went to Germany to study; microscopes, instruments, and laboratory glassware were imported from Germany; one did not do a research, one did an *Arbeit*; one did not speak of laboratory assistants, one spoke of the *Diener*. Small wonder then that many expressions were simply translations of the German. The word, "Archives" is simply a translation of German *Archiv*. The English use of the term, however, is absurd, since it is a place to keep records and presumably should be used for dead storage and not for new material. So dominated by German thought was American medicine that the *Archives of Internal Medicine* was launched in 1908 without a word of prefatory material. Forchheimer's well-known book, "The Prophylaxis and Treatment of Internal Diseases" (New York, 1906), evidently was copied from the German *innere Krankheiten*. So too we have through the years such textbooks as Musser's "Internal Medicine" (Philadelphia, 1932) and Yater's "Fundamentals of Internal Medicine" (New York, 1954). The American Medical Association nevertheless did not replace its section on the Practice of Medicine by one on Internal Medicine until 1945.

In Britain things are different. Although much closer to Germany, British medicine shows little evidence of German influence. To my knowledge, the term "internal medicine" is not used in England. There is no textbook on "internal medicine" nor is there a journal with "internal medicine" as part of the title.

So whatever implications may now be attributed to it, the origin of the term "internal medicine" is quite clear.

NOISE OF JET ENGINES MAY BE A HAZARD

While progress in aviation provides greater speed in travel and comfort, it introduces a noise hazard which if not recognized and understood can cause deafness. Until recently the noise of jet engines has been a problem associated primarily with the military air bases and experimental airfields of plane manufacturers. Since commercial aviation has entered the age of jet powered aircraft, the noise of jets will have some effect on many other persons, such as travelers, crew members, and ground personnel. Probably several million persons living very near airports will notice differences between the noise of jet aircraft and that of conventional propeller airplanes. Although these persons may complain of the noise, they are not likely to be deafened because the sound intensity will be lower than the hazardous levels.

Several thousand persons in the United States work at airports. The so-called ramp personnel, those who work outside and inside the terminal buildings and the operators in maintenance areas of airports, will at times be working in dangerous sound levels. In an article "Airports and Jet Noise,"[1] Miller, Beranek, and Kryter show that the sound-pressure levels 100 ft. from the center of the four-jet engine array during warm-ups and ramp operations may be as much as 110 db. This condition is not desirable, especially if a person is exposed to such noise intensity for long periods. If a person, attendant, or passenger should get nearer than 100 ft. the noise can cause injury to the ear.[2] The ramp attendants and service crews are required to use noise reduction ear plugs and ear muffs during the engine run-ups and other ground operations. When the jet engines are being serviced they are placed in acoustically treated test cells to protect the mechanics and to reduce the noise radiated to nearby residential areas. Reliable evidence indicates that passengers emplaning or deplaning will not be subject to hearing trauma. The occupants in the fuselage of the plane are also protected. If, however, a passenger or a helper should step too close to the exhaust of the jet engines, an injury within the ear could occur. Because people vary in their response to loud noises, the maximum safe noise-intensity level cannot be stated as a single over-all value. If a worker or passenger comes near the exhaust stream of a jet engine, as much as 120 db. in the 150 to 300 cycles per second band can be impressed on an unprotected ear. This is a dangerous sound intensity level.[2] Prolonged exposure to noise (in the 300 to 600 or 600 to 1,200 cycles per second bands) of the order of 85 db. suggests initiation of a noise-exposure control program and tests of hearing for those exposed to this noise.[3]

All physicians might well inform themselves about this hearing hazard which is an unfortunate by-product of progress in air travel.

1. Miller, L. N.; Beranek, L. L.; and Kryter, K. D.: Airports and Jet Noise, Noise Control 5:24-31 (Jan.) 1959.

2. Industrial Noise Manual, Detroit, American Industrial Hygiene Association, April, 1958.

3. Guide for Conservation of Hearing in Noise, Subcommittee on Noise in Industry, Committee on Conservation of Hearing, American Academy of Ophthalmology and Otolaryngology, Noise Control 3:23-31 (May) 1957.

ORGANIZATION SECTION

THE EMBLEM OF THE AMERICAN MEDICAL ASSOCIATION

George M. Fister, M.D., Ogden, Utah
and
Thomas A. Hendricks, Chicago

The gods of mythology, Mercury, Aesculapius, Zeus, Pluto, and others probably will shudder in their retreats to find another human writing about the caduceus. Many humans probably will be equally amazed at this attempt to clarify a confusion that has developed out of the simplicity of the gods' intentions.

The gods' intentions were probably very clear, but between the ancient Greeks, the slightly less ancient Romans, and modern physicians there has developed ambiguity and uncertainty about the emblem of medicine.

By definition the word caduceus is a Latin adaptation from the Greek, a herald's wand (kerykeion), so the only meaning that the word caduceus has is a herald's wand. It has no connection with and carries no implication as a symbol of medicine. The herald who carried the wand (the caduceus) was the Greek god Hermes, also referred to as Mercury by the Romans.

Now Hermes was quite a god of classical mythology. He was a messenger, a herald of assemblies, the patron of commerce and peace, god of the rogues, and was undoubtedly a clever thief and could roll a wicked game of dice. It would seem that he didn't have enough to do, so he was further assigned the duty of conductor of the souls of the dead to the infernal regions. Hermes was no doubt as fluid and as slippery as the metal called mercury.

It was clear that no herald could function without a wand; to do so would have been as impractical as a chairman without a gavel. So Hermes immediately secured for himself a straight piece of an olive tree branch which was used as his wand. Thus the herald's wand, or caduceus, became one of Hermes' sacred possessions and he was apparently seldom seen without it.

The transition from the simple herald's wand to the more elaborate one with two snakes entwined was probably a gradual process, the addition of the snakes having been inspired by various legends plus the artists' interpretations. One legend relates that Hermes found two snakes fighting with each other. Hermes separated them with his olive branch wand, and by his kindness and the snakes' appreciation, they entwined themselves on his wand. Since Hermes was the messenger of the gods, two wings were added to the wand. These perhaps were to give him an increase in speed as he carried messages between friends and enemies. Thus Hermes, with the caduceus, became an emblem of commerce and perhaps neutrality.

A review of the literature permits and sustains the conclusion that the caduceus was simply the herald's wand of the winged god Hermes and was (and still should be) an emblem of all of his numerous duties, which did not include medicine.

According to Arnold [1] "All the meanings that we might attach to the caduceus can be summed up into one: vis; that it symbolizes the peaceful condition of business—the mercantile world as opposed to the military." Nevertheless, the U. S. Army Medical Corps and the U. S. Public Health Service continue to use the emblem of Hermes as their insignia. Probably its use here is justified, the intent being to portray the noncombatant character of the Medical Corps rather than as an emblem of the medical profession. In addition, the name caduceus is used almost universally, except in England, France, and Germany, as the emblem of the medical profession, an error that seems impossible of correction, but one that merits our best efforts to correct.

What then is the true emblem of the American Medical Association? Mythology relates that the Greek god Asklepios (Roman Aesculapius) [2] "studied the healing art and soon surpassed his teacher (Chiron) for his patients never died and he even succeeded in recalling the dead." Thus Asklepios was recognized by the Greeks as the god of medicine. Up to this point there is no apparent confusion between the two, Hermes and Asklepios, but for professional reasons Hermes carried a wand and Asklepios carried a staff and each began association with snakes. Complication of the significance of the symbols was the immediate result.

It is quite likely that Hermes and Asklepios sensing the need for a cane or walking stick, each unknown to the other, picked up a branch. Hermes made a straight olive wand, while Asklepios, being a little more rugged, made a knotty pine staff. Then along came the serpent! Like any physician, Asklepios was satisfied with and perhaps could afford only one, but Hermes, trained in the ways of commerce, sought out two snakes. The snakes in each case followed their natural instincts and entwined themselves about the sticks, one on Asklepios' staff and two on Hermes' wand.

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Thus we have two symbols, the caduceus, a wand entwined with two serpents, and the staff of Asklepios, entwined with one serpent. Asklepios was recognized by the Greeks as god of medicine. His fame spread throughout the Mediterranean area and he is reported to have had many medical sanctuaries, one of them in Epidaurus near Athens. Medical therapy in the era of Asklepian temple healing, extending into the third century A. D., must have been impressive if not always curative for Asklepios is reported to have had a large following, what we would now refer to as a successful practice.

Of course Asklepios, the Greek physician, did not wear a stethoscope, but he was always seen with his heavy staff. After his death he was worshiped as a god by the Greeks and Romans. Mythology relates the origin of his birth, and his death was the result of Pluto's jealousy, who had Jupiter destroy him with a thunder bolt, which seems to be a noisy way the ancients had of removing any competition. Many shrines were built in honor of Asklepios, the god of health, where was carried on a special type of healing by incubation.

Serpents since the time of Adam have been regarded with both fear and admiration. The snake's annual renewal of its skin, the graceful movements, its speed and destruction of its prey gradually led to sacred fascination and worship. To the snake was attributed rejuvenation, convalescence, wisdom, and long life. The serpents soon participated in certain rituals that were a definite part of the healing and curative procedures in the Asklepian temples. In recognition the staff of Asklepios became adorned with a serpent, a symbol of the medical profession.[3] "Reproduction of the statues of Asklepios usually show the physician standing in flowing toga with his right hand clasping the staff, along which a single snake makes its way upward." There need be no uncertainty about who is the mythical Greek and Roman god of the art of medicine. All legends, documents, and statues point definitely to Asklepios.

The American Medical Association in 1910 by official action of the House of Delegates adopted a report by a committee that had been appointed to revise the emblem of the Association. The Committee stated "The true ancestral symbol of the healing art is the knotty pine and the serpent of Asklepios. That the color of the new emblem should be scarlet and gold and the new emblem should be the knotty rod entwined with the serpent." [4] Much credit is due the Committee that was assigned to this task.

In retrospect of the error and looking forward to its correction, the following summation is presented: 1. The word caduceus means a herald's wand. It is a straight wand entwined with two serpents. It is not an emblem of the medical profession (although it has been adopted by medical and lay organizations). 2. Asklepios was a medical deity or legendary physician and he was enshrined as the mythical god of medicine. 3. The emblem of the American Medical Association is the knotty staff of Asklepios, entwined with one serpent. This is not a caduceus and should not be confused with one or referred to as one. 4. The American Medical Association should conduct an educational program to correct the grossly negligent use of the word caduceus. State, county, and local medical societies should assist the program. All physicians should be made acquainted with the emblem of the American Medical Association, which is the staff of Asklepios (Roman Aesculapius).

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2. Veith, I.: Symbol of Medicine: Caduceus of Hermes or Knotted Staff of Aesculapius? **26:**138-148 (July 15) 1958. Zwick, K. G.: Origin and Significance of Medical Emblem, Bull. Soc. M. History, Chicago **4:**94-105 (April) 1928. Bremer, L. J.: Caduceus Again, New England J. Med. **258:** 334-336 (Feb. 13) 1958. Tobey, J. A.: Magic Wands of Medicine, Hygeia **8:**348-350 (April) 1930.

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REPORT OF JOINT COMMISSION ON ACCREDITATION OF HOSPITALS

The following items from the March, 1959, issue of the bulletin of the Joint Commission on Accreditation of Hospitals (660 N. Rush St., Chicago; Kenneth B. Babcock, M.D., director) are presented for the information they contain that will be of interest to many physicians.—Ed.

Report of Activities of Accreditation Commission for 1958

As of Dec. 31, 1958, there were 3,896 hospitals on the Joint Commission on Accreditation of Hospitals list (3,523 in the United States, 2 in the Canal Zone, 22 in Puerto Rico, 16 in Hawaii, 323 in Canada, and 9 in other countries). In 1958, the cost of a survey averaged $175.14. This figure does not include the sums spent by the American College of Surgeons and the American Hospital Association for overhead expenses of maintaining field staffs. If these were included, the cost per survey would be much more. Because of this monetary cost and the loss of precious time, the Commission is reluctant to cancel or postpone a scheduled survey. It is rare that another survey can be substituted for a cancellation, so time is lost and expenses go on. It sometimes happens that a hospital seeking accreditation for the first time cancels its survey when it is scheduled. The reason given is that the hospital is not yet ready and asks for more time to prepare for the survey. This procedure is costly

and should be avoided. A request for accreditation should not be made until the hospital is willing to have a survey. The Certificate of Accreditation is being revised. This is necessary because of the resignation of the Canadian Medical Association. This is taking longer than anticipated, so the certificate for those hospitals accredited since Jan. 1, 1959, will be delayed.

Canada Launches Its Own Accreditation Program

On Jan. 1, 1959, the Canadian Council on Hospital Accreditation assumed the responsibility of accrediting hospitals in Canada. To give its full support to this program, the Canadian Medical Association resigned its membership in the Joint Commission on Accreditation of Hospitals. Motivated by an admirable spirit of national independence, the organization of the Canadian Council marks the culmination of several years of working and planning. Its members are the Canadian Hospital Association, the Canadian Medical Association, the Royal College of Physicians and Surgeons of Canada, and L'Association des Medecine de Langue Francaise du Canada. The aim of the program is the same as that of the Joint Commission on Accreditation of Hospitals, namely to help improve the quality of care rendered to patients in hospitals. There will be little or no departure from the program established by the American College of Surgeons and the Joint Commission on Accreditation of Hospitals. The standards for hospital accreditation of the Commission have been adopted by the Council as a basis for accreditation, as well as the survey procedures and report forms.

In order to give full support to the Canadian program, the Joint Commission on Accreditation of Hospitals has agreed to discontinue surveying and accrediting hospitals in Canada. This does not mean that the Commission is less interested in Canadian hospitals, but rather that the Commission will do everything possible to help the Canadian program succeed. Effective liaison will be established on both governing and administrative levels and efforts will be made to keep both programs as much alike as possible.

Representation on the Board of Commissioners Changed.—With the resignation of the Canadian Medical Association, the members of the Joint Commission on Accreditation of Hospitals voted that representation on the Board of Commissioners will be as follows:

American College of Physicians	3 votes
American College of Surgeons	3 votes
American Hospital Association	7 votes
American Medical Association	7 votes

GOVERNMENT SERVICES

ATOMIC ENERGY COMMISSION

Strontium-90 Fall-out.—There is nothing good about radioactive fall-out, and a constant effort is being made to reduce it to the minimum. A comprehensive document (Health and Safety Laboratory Report No. 42, Environmental Contamination from Weapons Tests) issued recently gives a nearly complete summary of U. S. data up till about last summer. It is available through the Department of Commerce Office of Technical Services. The high levels found sometimes in wheat, rice, other grasses, and various vegetables apparently are due to the fact that these plants pick up more fall-out from the rain falling directly on the leaves than from the roots and the soil. As a consequence their level depends more on the rate of fall-out than on the total accumulated fall-out in the soil, though there definitely is some pickup from the soil. The soil pickup, however, does not lead to the large fluctuations with seasons of the year that are found in these grasses and remains at lower values than the peaks that direct leaf pickup can attain during a period of intense nuclear weapons testing when the rate of fall-out can be particularly high for a short time. The amount of strontium-90 found in these products at times exceeds the levels considered acceptable for a steady diet. The general average food level, however, is the important figure and this is well below the maximum permissible level as given by the National Committee on Radiation Protection.

PUBLIC HEALTH SERVICE

Personal.—Dr. Robert C. Berson, vice-president of the University of Alabama Medical Center in Birmingham; Dr. E. Dwight Barnett, director of the Palo Alto–Stanford Hospital Center in Palo Alto, Calif.; Dr. Owen H. Wangensteen, chief of the Department of Surgery at the University of Minnesota Medical School, Minneapolis; and Dr. Thomas B. Turner, dean of the Medical Faculty of the Johns Hopkins School of Medicine in Baltimore, Md., have been appointed members of the National Advisory Council on Health Research Facilities. This is a reappointment for Dr. Turner. These doctors will advise and make recommendations to the surgeon general on matters relating to the federal program to strengthen the nation's capacity for medical research by constructing and equipping health research facilities.

MEDICAL NEWS

ALABAMA

Annual Session in Birmingham.—The Medical Association of the State of Alabama will hold its annual session in Birmingham April 9-11, with headquarters at the Dinkler-Tutwiler Hotel and with Dr. Edgar G. Givhan Jr., president of the association, presiding. Dr. S. Joseph Campbell, president, Jefferson County Medical Society, will present an address at the opening business meeting. The scientific program will include the following papers by out-of-state speakers:

Practical Shortcuts in Endocrinology, Diagnosis and Treatment, Dr. Peter H. Forsham, San Francisco.
The Diagnostic Value of Intravenous Cholangiography in Biliary Tract Disorders and Acute Abdominal Conditions, Dr. H. Stephen Weens, Atlanta, Ga.
Dietary Management of Children in Illness and in Health, Dr. Frederic G. Burke, Washington, D. C.
Pruritus Vulvæ, Dr. J. Donald Woodruff, Baltimore.
Prenatal Care—The Pale Pink Pill, Dr. Lawrence L. Hester Jr., Charleston, S. C.

The Jerome Cochran Lecture, "Somatopsychic Medicine," will be given April 10 by Dr. Sara M. Jordan, Boston. Dr. Louis M. Orr, Orlando, Fla., President-Elect, American Medical Association, will present "Medical Show Window of the World," and Mr. Leo Brown, Director, Communications Division, A. M. A., will speak on "The Second Mile." The presidential dinner-dance April 10 will be held at the Vestavia Country Club. For information, write Mr. W. A. Dozier Jr., 19 S. Jackson St., Montgomery 4, Ala., Executive Secretary.

CALIFORNIA

Study of Altitude Effects on Newborn.—To study effects of altitude on the hearts of newborn babies, Dr. Herbert N. Hultgren, head of Stanford's Cardiovascular Research Laboratory, made a trip to the Andes of South America under a grant from the National Heart Institute, U. S. Public Health Service. His headquarters were a hospital in La Oroya, Peru (altitude, 12,500 ft.). He carried a portable electrocardiograph, but the remainder of his equipment was furnished by the hospital at La Oroya. Dr. Hultgren plans to survey the potential for more extensive studies in the future.

CONNECTICUT

Annual State Meeting in Hamden.—The 167th annual meeting of the Connecticut State Medical Society will be held in Hamden High School, Hamden, April 28-30. The House of Delegates will meet April 28, with Dr. Thomas M. Feeney, Hartford, speaker of the house, presiding. Eleven sectional meetings of society and guest organizations are planned for the afternoon of April 29, with the annual dinner scheduled for that evening. The following papers will be presented by out-of-state speakers:

Multiple Antibiotics—Use and Abuse, Dr. Monroe J. Romansky, Washington, D. C.
Chemotherapy of Cancer in Children, Dr. Sidney Farber, Boston.
The Place of Serum Enzyme Determinations in Diagnosis and Treatment, Dr. John S. LaDue, New York City.
The Problem of Chronic Pancreatitis, Dr. Kenneth W. Warren, Boston.
The Use of Enzymes and Anti-Inflammatory Drugs in Surgical Disease, Dr. Eugene E. Cliffton, New York City.
Management of the Patient with Peripheral Obliterative Arterial Disease, Dr. Robert R. Linton, Brookline, Mass.
New Trends in Management of Diverticulitis, Dr. Alfred S. Frobese, Philadelphia.
Diagnosis of Vulvar Lesions, Dr. Mortimer D. Speiser, New York City.

A symposium, "Upper Gastrointestinal Hemorrhage," will be conducted the afternoon of April 30, with Dr. Paul D. Rosahn, New Britain, as chairman. For information write the Connecticut State Medical Society, 160 St. Ronan St., New Haven 11, Conn.

DISTRICT OF COLUMBIA

Dr. Head Admitted to Virginia Bar.—Dr. E. Murdock Head, of the surgical department, George Washington University Hospital, was recently admitted to the Virginia Bar and to practice before the Court of Appeals of Virginia. Dr. Head has, in addition to his M.D., degrees in dentistry and law. He is primarily interested in the teaching of legal-medicine.

Personal.—Dr. Edward D. Freis, associate professor of medicine, Georgetown University School of Medicine, was recently elected vice-chairman and chairman-elect of the Council on High Blood Pressure Research of the American Heart Association. ——Dr. Ralph M. Caulk was reelected president of the medical staff of the Washington Hospital Center at a meeting March 2.

Dr. Hufnagel Gives Kober Lecture.—Dr. Charles A. Hufnagel, professor of surgery and director of the Experimental Surgery Laboratory at the Georgetown University School of Medicine, delivered the 1959 Kober Lecture at Georgetown University

Physicians are invited to send to this department items of news of general interest, for example, those relating to society activities, new hospitals, education, and public health. Programs should be received at least three weeks before the date of meeting.

March 11 on "The Basic Concepts of Cardiac and Vascular Reconstruction." The Kober Lecture is provided for by the Kober Foundation of Georgetown, established by the late Dr. George M. Kober, dean of the university's Medical School from 1900 to 1929. Dr. Hufnagel was selected for this year's honor by the executive committee of the Medical Society of the District of Columbia.

FLORIDA

Civic Advisory Council for School Development.—Creation of a new advisory council of civic leaders for the School of Medicine of the University of Miami was authorized by the trustees of the university. Mr. Hoke Maroon, president, Merchants Bank of Miami, was named temporary chairman of the new group. In outlining the responsibilities of the new council, Jay F. W. Pearson, Ph.D., president of the university, indicated that it would concern itself with institutional and financial development of the medical school and all phases of the school's operation touching on the public interest. The council will be responsible to the university board of trustees and, when fully formed, will consist of 21 civic leaders, of whom about one-fourth will be physicians. Subcommittees of the council will deal with institutional development, financial development, and community relations.

IOWA

Annual Meeting in Des Moines.—The 1959 annual meeting of the Iowa State Medical Society, organized in 1850, will be held April 19-22 in the Veterans Memorial Auditorium, Des Moines. The president's address will be given by Dr. Walter D. Abbott, Des Moines. Dr. Ralph M. Kniseley, Castro Valley, Calif., will give the Arthur Erskine Memorial Lecture, "Important Non-Biological Contributions to Radioisotopic Diagnosis," April 21. Papers by out-of-state speakers include:

Aneurysms and Occlusive Disease of the Aorta and Peripheral Arteries: Experience with 2,000 Cases, Dr. George C. Morris Jr., Houston, Texas.

The Growth Pattern of Endometriosis, Dr. Roger B. Scott, Cleveland.

Respiratory Obstruction in Infants, Dr. F. Johnson Putney, Philadelphia.

Pediatric Urology, Dr. Robert Lich Jr., Louisville, Ky.

The Role of the Family Physician in Congenital Heart Disease, Dr. Patrick A. Ongley, Rochester, Minn.

Child Psychiatry for the General Practitioner, Dr. Reynold A. Jensen, Minneapolis.

Factitial Enteritis: An Unusual Cause of Intestinal Obstruction, Chronic Blood Loss, or Malabsorption Syndrome, Dr. William G. Sauer, Rochester, Minn.

The Place of Radioactive Isotopes in the Community Hospital, Dr. Frank R. Hendrickson, Chicago.

Problems Involved in the Treatment of Injuries to the Central Nervous System, Dr. Winchell M. Craig, Rochester, Minn.

Symposiums on "Exfoliative Cytology" and "Clinical Uses of Radioisotopes" are planned. Dr. Gunnar Gundersen, LaCrosse, Wis., President, American Medical Association, will present "Keeping the Paths Open" April 22. Scientific and technical exhibits and special meetings and dinners are arranged. The annual golf tournament will be held April 19, and the annual banquet, April 21, 7 p. m. The scientific program is acceptable to the American Academy of General Practice for 12 hours credit in category II.

KENTUCKY

Report on Diabetes Detection Drive.—One hundred eighty newly proved diabetics were discovered in Kentucky during the 1958 Diabetes Detection and Education Drive sponsored by the Kentucky State Medical Association in November. Dr. Robert J. Hoffmann, South Fort Mitchell, chairman, KSMA's Associate Committee on Diabetes, has announced. More than 90,500 Kentuckians in 72 counties were tested free of charge during the drive, according to the latest reports. Of these, 1,166 were found to have positive urine sugars. Final figures in the previous drive in 1957 indicated that 52,400 were tested in 83 counties and 137 newly proved diabetics were discovered.

LOUISIANA

Pediatric Meeting Features British Physician.—The Baton Rouge Pediatric Society announced that its June 16 quarterly meeting will consist of a program by Dr. Alan A. Moncrieff, chief of staff, The Hospital for Sick Children, Great Armond Street, London, England. The subject will be "Biochemistry and Mental Defects." For information write Dr. Francis M. Harris Jr., Secretary-Treasurer, Baton Rouge Pediatric Society, 1401 N. Foster Dr., Baton Rouge, La.

University News.—Dr. Alvar P. Wilska, of Helsinki, Finland, was appointed visiting professor of cell research at the Louisiana State University School of Medicine, New Orleans. Dr. Wilska will continue his work on the new electron microscope and inaugurate additional research projects in the department of anatomy with Frank N. Low, Ph.D., university professor and director of the electron microscope laboratory at Charity Hospital. A graduate of Helsinki University, Dr. Wilska received a degree of doctor of medicine and surgery in 1938 and served there as professor of physiology since 1944. He assumed his new duties Jan. 5.

MARYLAND

Annual Meeting in Baltimore.—The Medical and Chirurgical Faculty of Maryland will hold its 161st annual meeting April 15-17 at the Alcazar, Baltimore. Four illustrated papers will be given the afternoon of April 15:

Surgical Treatment of Aortic Valvular Disease, Dr. Charles A. Hufnagel, Washington, D. C.

Leukemia: Present Status, Dr. William Dameshek, Boston.
Surgical Treatment of Chronic Pancreatitis (J. M. T. Finney Fund Lecture), Dr. Ralph F. Bowers, Memphis, Tenn.
Atherogenesis and Lipid Metabolism, Dr. Charles F. Wilkinson Jr., New York City.

Dr. J. Sheldon Eastland, president of the faculty, will preside at a medicolegal symposium, "Whiplash Injuries: A Conference Between the Counsel and Medical Witnesses." The William Royal Stokes Memorial Lecture will be given by Dr. Horace L. Hodes, New York City, on "Staphylococcal Infections in the Antibiotic Era." Panel discussions on adrenocortical steroid therapy and on therapeutic uses of radioiodine are planned. The I. Ridgeway Trimble Fund Lecture, "Lesions of the Adrenal Glands (Illustrated)," will be presented by Dr. James T. Priestley, Rochester, Minn., April 16, to be followed by Dr. Edgar V. Allen, Rochester, Minn., presenting "The Natural History of Arteriosclerosis Obliterans (Illustrated)." Milton S. Eisenhower, president, Johns Hopkins University, Baltimore, will speak on "Our Partnership with Latin America" at a general meeting April 16, following the presidential dinner ($6.50). Round-table luncheon discussions (April 16) and exhibits are planned. Twelve hours category I credit will be given by the American Academy of General Practice for attendance. For information write Mr. John Sargeant, 1211 Cathedral St., Baltimore 1, Md., Executive Secretary.

MICHIGAN

Annual Conference on Aging.—"Designs for Retirement" will be the theme of the University of Michigan's 12th annual Conference on Aging June 22-24 in Ann Arbor. Over-all plan for the conference calls for five separate groups to meet simultaneously. Topics covered will include retirement health, retirement housing, retirement financing, retirement preparation, and uses of retirement. For information on the conference, write the Director, Wilma Donahue, Chairman, U-M Division of Gerontology, 151 Rackham Building, Ann Arbor, Mich. On June 24-26, immediately following the conference, the U-M will host a National Leadership Training Institute for the White House Conference on Aging. The institute is sponsored by the U. S. Department of Health, Education, and Welfare in cooperation with other interested federal agencies and the university.

Health Survey of Tecumseh.—Individual physical examinations for more than 8,000 residents of the Tecumseh area are scheduled as a result of a two-year grant of $280,000 given to The University of Michigan School of Public Health by the National Heart Institute, a branch of the U. S. Public Health Service. Researchers plan to make a complete health survey of each individual, but will seek special details on heart disease and related disorders. Each person will be notified of the results of his examination, and detailed medical reports will go to family physicians. The total body of data will be used to create a comprehensive picture of sickness and health in a single community. Dr. Thomas Francis Jr., who directed the nationwide field trials of the Salk polio vaccine, and Dr. Frederick H. Epstein are in charge of the survey. It is part of a broader community study directed by Dr. Robert J. M. Horton. All are faculty members of the University of Michigan School of Public Health.

MISSISSIPPI

New Department of Clinical Laboratory Science.—The University of Mississippi School of Medicine, Jackson, has created an independent department of clinical laboratory science, with Dr. Warren N. Bell as its chairman. The new department was formerly a division in the department of medicine, and Dr. Bell retains his appointment as an associate professor of medicine in addition to his new chairmanship.

MONTANA

Interim Meeting Held in Helena.—The 12th interim session of the Montana Medical Association was held April 3-4 in the Western Life Insurance Company Building, Helena, with Dr. Herbert T. Caraway, president of the association, presiding at the morning session April 3. Four panel discussions were held, with the following titles and moderators:

The Use and Disuse of ACTH and Adrenocorticoid Drugs, Dr. George B. LeTellier, Lewistown.
The Business Side of Your Profession, Mr. Norman McGinty, Billings.
Treatment of Acute Multiple Injuries, Dr. Warren H. Randall, Miles City.
Clinical Pathological Conference, Dr. Bernard J. Winter, Billings.

Three motion pictures were shown, and a tour of the State Board of Health Laboratory was held. At the banquet April 3, Dr. Everett H. Lindstrom, Helena, was the toastmaster.

NEW JERSEY

State Convention in Atlantic City.—The 193rd annual meeting of the Medical Society of New Jersey will be held April 25-29 in Haddon Hall, Atlantic City. An open "Discussion on Medical-Surgical Plan" will follow the Golden Merit Award ceremony April 25, and the House of Delegates will meet April 25, 26, and 27. Over 15 section meetings will be held April 28 and 29, with the following symposiums included:

Bronchial Asthma as an Occupational Hazard (Allergy).
Which of Your Patients Can Now Be Benefited by Cardiac Surgery? (Cardiovascular Diseases).

Diarrhea (Gastroenterology and Proctology).
The Prevention of Perinatal Loss (Obstetrics and Gynecology).
Certain Aspects of Eye Care in Children (Ophthalmology and Pediatrics).

At the general practice session, Drs. Milton Jabush, Lakewood, Abraham Weinberg, New York City, and Jacob H. Conn, Baltimore, will present "The Use of Hypnosis in Obstetrics," "Hypnosis in General Practice," and "Medical Hypnosis, Its Use and Abuse," respectively. Motion-picture theaters, special luncheons, and scientific and technical exhibits are planned. The Doctors' Chorus of the Essex County Medical Society will entertain at the dinner-dance April 28, 7 p. m. For information write the Medical Society of New Jersey, 315 W. State St., Trenton 8, N. J.

NEW YORK

Increase in Rabies in 1958.—The number of laboratory confirmed cases of rabies increased in the state in 1958. During the year, a total of 261 cases was reported to the Bureau of Epidemiology and Communicable Disease Control, New York State Department of Health, compared with 202 cases in 1957. Dr. Herman E. Hilleboe, state health commissioner, stated that the number was 55 less than that reported for 1956, however. Rabies was reported in 26 counties, being most prevalent in the following: Otsego, 65 cases; Delaware, 46; Chenango, 28; Madison, 23, and Steuben, 21. A total of 146 cases was reported in cattle. Other cases included dogs, 21; foxes, 56; cats, 21; raccoons, 7; sheep, 5, and horses and bats, two each. Dr. Hilleboe said that in recent years the reported incidence of rabies has been cyclic in nature with peaks of decreasing magnitude occurring every three or four years, starting with the peak incidence of 1,155 cases reported in 1946.

Study of Gamma Radiation.—An aerial survey to determine existing gamma radiation for an area of New York State, reportedly the first to be conducted by a state health department, was completed in the Hudson Valley area. Dr. Herman E. Hilleboe, State Health Commissioner, said establishment of existing gamma radiation levels makes it possible to compare preoperational and operational gamma levels for the area in the vicinity of atomic power plants. The survey was made in a helicopter provided by the Department of Defense. Five counties in the Lower Hudson River Drainage Basin are included in an environmental radiation survey being conducted by the State Health Department in cooperation with local health departments and the State Conservation Department. The others are Dutchess, Orange, Putnam, and Rockland. It is expected that by 1960, three nuclear reactors will be in operation in the Lower Hudson River Drainage Basin. The results of the aerial survey are being coordinated with the over-all sampling and spot checks in this area. When the preoperational aerial survey was made, the major contributing factors to gamma-ray emissions recorded included: cosmic radiation, natural radium and daughter products in the soil, rock, and vegetation, daughter products of radon in the air, natural potassium-ro in the soil, rock and vegetation, and particulate air matter and absorbed fission products on the ground resulting from the continuous fallout of fission products associated with nuclear test devices.

New York City

Physicians' Wives Hold Dinner-Dance.—Physicians and their wives of Greater New York are invited to attend a dinner-dance, sponsored by the Physicians' Wives League of Greater New York, to be held April 5 at the Waldorf Astoria Hotel. The league works to aid indigent physicians and their families. For information, write Mrs. Louis Wexler, 5 E. 76th St., New York 21.

Triplets Exceed Statistical Expectations.—More than three times as many triplets have been born in New York City so far this year as were statistically expected. There were 10 sets of triple births since the first of the year, Carl Erhardt, director of the Bureau of Records and Statistics, New York State Department of Health, announced March 8. Three sets of triplets were expected because vital statistic records show that triple births usually occur once in 9,900 deliveries. Since there have been 28,000 births so far this year, three sets of triplets was the statistical expectation. Instead of three sets among these 28,000 births, there were 10. Of the 30 babies in these 10 sets of triplets, 4 died at birth, 26 lived. Among the 167,775 births which occurred in 1958, there were 15 sets of triplets. Of these 45 infants, three died at birth, 42 lived. The triple births by boroughs were:

	1958	1959
Manhattan	4	1
Bronx	2	—
Brooklyn	4	5
Queens	5	2
Richmond	—	2
	15	10

Dr. Cooper Cited by Hospital.—Dr. Irving S. Cooper, director, department of neurosurgery, St. Barnabas Hospital for Chronic Diseases, Bronx, was honored by the hospital's board of managers at their 93rd annual meeting. Dr. Cooper, who developed the chemopallidectomy and who is professor of research surgery and director of the division of neuromuscular diseases at New York University Postgraduate Medical School, was awarded a citation by St. Barnabas Hospital in recognition of "distinguished leadership and outstanding contributions to medical science and to the professional services of St. Barnabas Hospital

in the field of neurosurgical research and the treatment and alleviation of extrapyramidal disorders." As part of the ceremonies, a 27-minute sound film was shown.

Survey of Orthopedic Ailments in Children.—A youth health survey, in which 600 presumably normal children, age 10 to 14 years, from the Sen. Robert F. Wagner Junior High School in Manhattan were examined for unsuspected orthopedic ailments, was completed at the Hospital for Joint Diseases March 6 after 4½ months of work. The study was undertaken under the auspices of the Board of Education, the Department of Health, and the Hospital for Joint Diseases, a voluntary, nonprofit hospital located at 123rd Street and Madison Avenue. The hospital reported finding a considerable number of children with orthopedic difficulties of some kind, many of them previously unsuspected. Most of these ailments were minor, requiring corrective exercises, but a few serious conditions, resulting from "growth disturbances," were noted. All abnormalities found were promptly reported by the hospital to the principal of Robert F. Wagner Junior High School and to the Department of Health's Bureau of School Health, so that the parents could be alerted to bring their children under treatment. Robert F. Wagner Junior High School was chosen for the study by a joint hospital, Board of Education, and Department of Health committee because the students were deemed to constitute a representative cross-section of the city's school population in the 10-14 age bracket. The examinations have been conducted at the hospital's orthopedic clinic every Friday afternoon since Oct. 24, 1958, under the supervision of Dr. Michael S. Burman, attending orthopedic surgeon.

NORTH CAROLINA

Plan Building for Aging Study.—Plans for a building to house the Duke University Regional Center for the Study of Aging were announced by Duke President Hollis Edens. The structure will provide facilities for a multipronged attack on the problems of aging by researchers in medical, biological, social, and behavioral sciences. A construction grant of $388,000 was made to Duke by the National Institutes of Health, research center of the U. S. Public Health Service. Matching funds, now being sought by the university, will bring the total to $776,000. Preliminary plans call for the building to be erected in front of Duke Hospital where a parking area is now located near the hospital emergency entrance. The structure will be of modified Gothic architecture and will be faced with native North Carolina stone to match other West Campus buildings. Some 35,000 square feet of floor space will be provided by five stories, including a basement and sub-basement. Dr. Ewald W. Busse, Duke psychiatry department chairman, is head of the Regional Center for the Study of Aging. Representing a concentration of University-wide interest in this field, the center was established in July, 1957, with U. S. Public Health support which will total $1,500,000 over a five-year period. The Ford Foundation recently augmented these funds with a $200,000 grant for a sociological-economic study in aging.

OHIO

Dr. Griffith to Give Annual Lecture.—Dr. Harold R. Griffith, emeritus professor of anesthesia, McGill University, Canada, will be the guest speaker at the third annual Rolland J. Whitacre Memorial Address, sponsored by the Cleveland Society of Anesthesiologists. His talk, entitled "Adventures and Misadventures in Forty Years of Anaesthesiology," will be given at a dinner meeting at the Tudor Arms Hotel, Cleveland, the evening of May 20. For reservations, write Dr. Sidney W. Helperin, 20665 Centuryway, Maple Heights 37, Ohio.

Personal.—Dr. Robert J. Izant Jr. was appointed chief of the division of pediatric surgery in the department of surgery at University Hospitals of Cleveland. He also holds the appointment of assistant professor of surgery at Western Reserve University School of Medicine. He assumes the post formerly held by Dr. Edward Gerrish who has entered private practice in Minnesota. Prior to this appointment, Dr. Izant was the associate professor of surgery (pediatrics) at Ohio State University College of Medicine for three years.——Dr. Perry R. Ayres, Columbus, succeeded Dr. Jonathan Forman as editor of the *Ohio State Medical Journal*. Dr. Forman resigned in October. Dr. Ayres was editor and chief of *The Bulletin of the Columbus Academy of Medicine*, having served as associate editor of the publication from 1951 to 1957.

Annual Meeting in Columbus.—The annual meeting of the Ohio State Medical Association will be held April 21-24 in the Veterans Memorial Building, Columbus. The Ohio State Heart Association and the Ohio Division of the American Cancer Society are presenting the first day's programs. Ohio State University College of Medicine will present the final day's program in celebration of its 125th anniversary. Panel discussions to be held at the general sessions include "Treatment of Uterine Cancer," "Cancer of the Gastrointestinal Tract," and "Hypertension," moderated by Dr. Richard L. Meiling, Columbus, Dr. Robert M. Zollinger, Columbus, and Dr. Maurice A. Schnitker, Toledo, respectively. Specialty sections will be conducted April 22-23, including several combined programs. Over 30 guest participants are scheduled to speak, including Dr. Alejandro Aguirre, professor of pediatrics, National University of Mexico, Mexico,

D. F., who will present a paper the afternoon of April 22. Scientific and technical exhibits are planned. The annual banquet, to be held the evening of April 22, will feature the 42 members of the Montgomery County Medical Society Glee Club. For information write the Ohio State Medical Association, 79 E. State St., Columbus 15, Ohio.

PENNSYLVANIA

Philadelphia

Dr. Elliott Heads Hospital Department.—Dr. Frank A. Elliott, of London, arrived in Philadelphia to assume the post of neurologist to Pennsylvania Hospital and head of its department of neurology. This announcement coincided with Dr. Elliott's appointment as professor of clinical neurology, University of Pennsylvania School of Medicine. At Pennsylvania Hospital, Dr. Elliott will establish a neurological center to investigate the causes, treatment, and prevention of the common stroke and related neurological conditions. Funds for this project, amounting to $357,960, have been received as a grant from the John A. Hartford Foundation, Inc., of New York City, established by John A. Hartford, who, prior to his death in 1951, was president of the Great Atlantic and Pacific Tea Co. A native of South Africa, Dr. Elliott received his medical education at the University of Cape Town Medical School.

Open New Laboratory at Hahnemann.—On March 9 Dr. Charles S. Cameron, dean of Hahnemann Medical College, formally opened the 111-year-old institution's third new research laboratory in a year, the Laboratory for the Study of Lipids and Atherosclerosis. The new laboratory, under the direction of Dr. John J. Spitzer, associate professor of physiology, is another step in the planned expansion of Hahnemann's facilities for medical research, following the inauguration of the Institute for Biochemical Studies in Cancer in March, 1958, and the opening of the Cytology Laboratory in February. The Laboratory for the Study of Lipids and Atherosclerosis will chart the distinguishing characteristics between normal and diseased hearts with regard to lipid metabolism and the utilization of energy by the heart. The new facilities occupy an entire floor in a building adjoining the college. Dr. Spitzer has received more than a quarter-million dollars in research funds from the National Heart Institute, and additional support from the Southeastern Pennsylvania Heart Association, and the Smith, Kline, and French Foundation.

City Operates Tuberculosis Institute.—The City of Philadelphia has assumed responsibility for operation of the dispensaries of the Henry Phipps Institute of the University of Pennsylvania, as of March 2, Dr. Julius L. Wilson, director of the institute and professor of preventive medicine at the University, announced March 4. The institute is located at 7th and Lombard streets. Dr. Wilson said this development stemmed from a long period of increasing financial burden on the part of the institute to care for indigent tuberculosis patients. Dr. Wilson pointed out that the city had provided this service on a contractual basis at the Phipps Institute for the past five years. Two other tuberculosis clinics established by the Phipps Institute were long ago transferred to city control. The Henry Phipps Institute was founded in 1903 by the late Henry Phipps for the study, treatment, and prevention of tuberculosis. Present plans include moving its teaching and research activities from the present location to a new building to be constructed adjacent to the planned new West Philadelphia Health Center, which will be located at 43rd Street and Chester Avenue.

GENERAL

Railway Surgeons Meeting in Chicago.—The 71st annual meeting of the American Association of Railway Surgeons will be held April 16-18 at the Drake Hotel, Chicago. At the annual dinner April 17, 7:30 p. m., Dr. A. A. Nygood, Chicago, president of the association, will serve as toastmaster. On April 16, 2 p. m., Dr. David I. Abramson, Chicago, will moderate a symposium on "Peripheral Vascular Diseases," and the afternoon of April 17 Dr. Clifford J. Barborka, Chicago, will moderate a symposium, "Problems in the Management of Peptic Ulcer," as part of a gastroenterology program which includes as a participant Dr. Richard D. McKenna, Montreal, Canada. Surgical and medical movies are planned for the afternoon of April 18. For information write Dr. Chester C. Guy, Secretary, American Association of Railway Surgeons, 5800 Stony Island Ave., Chicago 37.

Orthopedic Meeting in Omaha.—The sixth annual meeting of the Mid-Central States Orthopedic Society will be held April 9-11 at the Town House, Omaha, under the presidency of Dr. Werner P. Jensen, who will open the meeting. Of the papers scheduled, the following will include invited authors:

Tetracycline Fluorescence in Bone Tumors, Dr. John E. McLeay, Omaha.

Experimental Studies and Practical Applications, Dr. Richard E. Ogborn.

Blood Volume Determination, Drs. Lawrence R. James, and L. Thomas Hood, Omaha.

Discussions will follow the papers. A program of tours, a bowling tournament, and other entertainment are arranged, including women's activities. For information write the Mid-Central States Orthopedic Society, 3244 E. Douglas, Wichita 8, Kan.

Anesthesiology Meeting in Birmingham.—The annual meeting of the Southern Society of Anesthesiologists will be held April 23-25 in the Dinkler–Tutwiler Hotel, Birmingham, Ala. Dr. Ralph Berson, dean and vice-president of medical affairs, University of Alabama, Birmingham, will open the meeting with an address. Over 20 papers are scheduled for presentation, and a movie, "Respiratory Resuscitation Techniques," will be shown the afternoon of April 24. A demonstration, "Pump for Extracorporeal Circulation with Possible Demonstration on Patients," will be presented by Drs. Frank A. Berg, Eugene C. Clark, and Champ Lyons, Birmingham. A round-table luncheon is planned for April 23. A program of ladies' entertainment is arranged. For information, write Dr. Ray T. Parmley, 529 N. Hillside St., Wichita 6, Kan., Secretary-Treasurer.

Meeting on Thoracic Surgery.—The 39th annual meeting of the American Association for Thoracic Surgery will be held April 21-23 in Los Angeles with headquarters at the Statler Hilton Hotel. The presidential address will be given April 22, 3 p. m., by Dr. Michael E. De Bakey, Houston, Texas. Forty-two papers are scheduled, including the following by invited participants:

An Improved Inexpensive Automatically Controlled Pump-Oxygenator, Drs. Adrian Kantrowitz, and Donald Abelson, Brooklyn.

An Externally Valved Hydraulic Cardiac Substitute, Drs. I. A. Breckler, R. L. Ginsberg, C. L. Portnoff, and Jack L. Bitterly, Encino, Calif.

A New Foam Plastic Arterial Prosthesis, Richard W. Hardy, Washington, D. C.

The Cause of Death Following Cardioangiography, Dr. Raymond C. Read, Minneapolis, Minn.

The banquet will be held at 7 p. m., April 22. For information write The American Association for Thoracic Surgery, 7730 Carondelet Ave., St. Louis 5, Dr. Hiram T. Langston, Secretary.

World Health Day.—World Health Day, April 7, marks the 11th anniversary of the World Health Organization. In recognition of mental illness as one of the major problems of world health, WHO chose "Mental Illness and Mental Health in the World of Today" as the theme for World Health Day 1959. Dr. M. G. Candau, director-general, World Health Organization, has stated that "in countries with well-developed health services, about half the total number of hospital beds are occupied by psychiatric cases. . . . This increase in mental ill health, involving whole populations, has fortunately been accompanied by rapid progress in the treatment and prevention of mental disease, and also by a better understanding for the psychological strains and stresses that gravely affect everyday behaviour and are not without influence on the well-being of mankind." According to Dr. Candau, World Health Day 1959 offers a suitable starting point in all countries "for a continuing crusade aimed at disseminating better knowledge of mental health problems, ensuring better care for the mentally unfit, and providing better chances for children to grow up in robust mental health."

Arteriosclerosis Society Merges with Heart Association.—The American Society for the Study of Arteriosclerosis merged with the American Heart Association, Dr. Francis L. Chamberlain, president of the association, has announced. The society became the Council on Arteriosclerosis of the American Heart Association. This brings to eight the number of councils now active in the heart association's program. The other councils cover clinical cardiology, cardiovascular surgery, circulation, high blood pressure, rheumatic fever and congenital heart disease, basic science, and community service and education. Since its establishment in 1947 by a group of investigators concerned with this phase of circulatory disease, the arteriosclerosis society has cooperated with the American Heart Association, which was reorganized as a voluntary health agency in 1948. In October, 1958, the society held its annual meeting to coincide with the heart association's annual scientific sessions in San Francisco and several joint programs were conducted. Following an invitation by the association to merge as a council, a large majority of the society's members voted in favor of the amalgamation. The new Council on Arteriosclerosis will hold a scientific session and a symposium as part of the heart association's 32nd annual scientific sessions in Philadelphia, Oct. 23-25, followed by an independent council meeting in November. Officers elected to the new Council on Arteriosclerosis are Dr. James C. Paterson, London, Ontario, Canada, chairman; Forrest E. Kandall, Ph.D., New York, vice-chairman; Dr. Otakar J. Pollak, Dover, Del., secretary; and Dr. Aaron Kellner, New York, program chairman.

Survey of Needs in Tropical Medicine.—The National Academy of Sciences–National Research Council has announced the undertaking of a major survey of needs in tropical medicine. The survey will be directed by Willard H. Wright, Ph.D., recently retired as chief of the Laboratory of Tropical Diseases, National Institutes of Health. Advocated for several years by the American Society of Tropical Medicine and Hygiene, the survey was proposed to the academy-research council by the Department of Defense on recommendation of the Armed Forces Epidemiological Board. Support has now been assured by the National Institutes of Health, the Department of the Army, and the Rockefeller Foundation. The survey will embrace the fields of infectious and parasitic diseases, vet-

erinary medicine, and environmental hygiene. It will include surveys of disease problems in tropical and subtropical areas of significant importance to public health and to agricultural and industrial development; of funds expended for medical care and disease control; of financial support for research in medical and hygienic problems of the tropics; of fellowship opportunities, teaching programs, and training facilities; of career opportunities and incentives; of the impact of travel and migrations on tropical disease problems; of the importance of tropical medicine to the economy of the United States; and of projected manpower needs in terms of domestic and overseas requirements. On the basis of these data it will assess the need for domestic, foreign, and international measures to deal with the problems defined in the survey. The National Academy of Sciences–National Research Council is a private, nonprofit organization of scientists dedicated to the furtherance of science and its use for the general welfare. Its congressional charter, signed in 1863 by President Abraham Lincoln, calls upon the academy to advise the government, upon request, in all matters of scientific and technical interest.

Symposium on Myasthenia Gravis.—The Myasthenia Gravis Second International Symposium in conjunction with the American Academy of Neurology will meet at the Statler-Hilton Hotel, Los Angeles, April 18-19. Papers which include foreign authors are scheduled as follows:

The Neuromuscular Defect in Myasthenia: Electrophysiological and Histopathological Evidence, J. E. Desmedt, Brussels, Belgium.

Some Pathophysiological Mechanisms of Motor Disturbances in Myasthenia, N. I. Grashchenkov and L. B. Perelman, Moscow, U. S. S. R.

Electromyographic Studies in Myasthenia Gravis Correlated to Mechanical Events, Albrecht Struppler and Elizabeth Struppler, Munich, Germany.

A Study of Neuromuscular Transmission in 100 Cases of Myasthenia Gravis, H. C. Churchill-Davidson and A. T. Richardson, London, England.

The Isolation of Quaternary Nitrogen Compounds from Extracts of Thymus Glands, Peter T. Nowell and Andrew Wilson, Liverpool, England.

Some Pharmacologic Properties of Gamma Butyrobetaine, E. A. Hosein, Emma Ottolenghi, and Sheila Dorfman, Montreal, Quebec, Canada.

Recent Work on the Mechanism of Myasthenia Gravis, with Special Reference to the Metabolism of Progesterone, Raymond Greene and I. Schrire, London, England.

The Incidence of Myasthenia Gravis in a Sample Population, George Pennington and Andrew Wilson, Liverpool, England.

Evaluation of Keynes' Large Series of Thymectomics, R. T. Ross, Winnipeg, Canada.

Physiological Concept of the Central Action of the Carotid Sinus, Pierre Passouant, Montpellier, France.

Carotid Sinus Denervation, Andre Thevenard, Paris, France.

A panel, "What Is and What Is Not Myasthenia Gravis?" (Lee M. Eaton Memorial Panel), will be held the morning of April 19, with Dr. Robert B. Aird, San Francisco, as chairman. For information write the Myasthenia Gravis Foundation, Inc., 155 E. 53rd St., New York 10. The program is co-sponsored by the foundation and the National Institute of Neurological Diseases and Blindness.

FOREIGN

Congress on Plastic Surgery in London.—The International Congress of Plastic Surgery, organized by the British Association of Plastic Surgeons, will be held at the Royal College of Surgeons of England, London, July 12-17, under the patronage of His Royal Highness the Duke of Edinburgh. The scientific program will include papers grouped to form symposiums under the following headings:

Surgery of Congenital Deformities
The Surgery of Skin Cancer
Industrial Injuries to the Hand
Trauma of the Face
Cosmetic Surgery
Anesthesia in Plastic Surgery
Research Projects

A Trade Exhibition is being organized at the Royal College of Surgeons. The social program will include the president's reception, a performance at the Royal Opera House, and a banquet on the last night of the congress. For information write Mr. David Matthews, Organizing Secretary, International Congress on Plastic Surgery, c/o Institute of Child Health, Hospital for Sick Children, Great Ormond St., London, W. C. 1, England.

EXAMINATIONS AND LICENSURE

NATIONAL BOARD OF MEDICAL EXAMINERS

National Board of Medical Examiners: Part II only, April 21-22; Parts I and II, June 16-17; Part I only, Sept. 9-10. Examinations must be received at least six weeks in advance of a specific examination date. Examining centers established after close of registration. Exec. Sec., Dr. John P. Hubbard, 133 South 36th St., Philadelphia 4.

EDUCATIONAL COUNCIL FOR FOREIGN MEDICAL GRADUATES, INC.

Educational Council for Foreign Medical Graduates: Stations around the world, Sept. 22. Final date for filing application is June 22. Exec. Director, Dr. Dean F. Smiley, 1710 Orrington Ave., Evanston, Ill.

BOARDS OF MEDICAL EXAMINERS

ALABAMA: *Written.* Montgomery, June 16-18. Sec., Dr. D. G. Gill, State Office Bldg., Montgomery 4.

ALASKA:* On application in Anchorage and Juneau. Sec., Dr. W. M. Whitehead, 172 South Franklin St., Juneau.

ARIZONA:* *Examination.* Phoenix, Apr. 15-17. *Reciprocity and Endorsement.* Phoenix, April 18. Exec. Sec., Mr. Robert Carpenter, 826 Security Bldg., Phoenix.

ARKANSAS:* *Examination and Reciprocity.* Little Rock, June 11-12. Sec., Dr. Joe Verser, Harrisburg.

CALIFORNIA: *Written.* San Francisco, June 15-18; Los Angeles, Aug. 17-20; Sacramento, October 19-22. *Oral.* San Francisco, June 13; Los Angeles, August 15; San Francisco, November 14. *Oral and Clinical.* San Francisco, June 14; Los Angeles, August 16; San Francisco, Nov. 15. Sec., Dr. Louis E. Jones, Room 536, 1020 N Street, Sacramento.

DELAWARE: *Examination.* Dover, July 14-16. *Endorsement.* Dover, July 23. Sec., Dr. Joseph S. McDaniel, Professional Bldg., Dover.

DISTRICT OF COLUMBIA:* *Written.* Washington, June 8-9. Final date for filing application is May 1. Sec., Dr. Daniel Leo Finucane, 1740 Massachusetts Ave., N. W., Washington.

FLORIDA:* *Examination.* Miami Beach, June 21-23. Sec., Dr. Homer L. Pearson, 901 N.W. 17th St., Miami 36.

GEORGIA: *Examination and Reciprocity.* Atlanta, June 10-11. Sec., Mr. C. L. Clifton, 224 State Capitol, Atlanta 3.

GUAM: *Subject to Call.* Act. Sec., Dr. F. L. Conklin, Agana.

HAWAII: *Written.* Honolulu, July 13-14. Sec., Dr. I. L. Tilden, 1020 Kapiolani St., Honolulu.

IDAHO: *Examination and Endorsement.* Boise, July 13. Exec. Sec., Mr. Armand L. Bird, 364 Sonna Bldg., Boise.

ILLINOIS: *Examination.* Chicago, April 6-9. *Reciprocity.* Chicago, April 10. Supt. of Registration, Mr. Fredric B. Selcke, Capitol Bldg., Springfield.

INDIANA: *Examination.* Indianapolis, June 17-19. Exec. Sec., Miss Ruth V. Kirk, 538 K. of P. Bldg., Indianapolis.

IOWA:* *Examination.* Iowa City, June 15-17. Exec. Sec., Mr. Ronald V. Saf, State Office Bldg., Des Moines 19.

KANSAS:* *Examination and Endorsement.* Kansas City, June. Sec., Dr. F. J. Nash, New Brotherhood Bldg., Kansas City.

KENTUCKY: *Examination.* Louisville, June 8-10. Sec., Dr. Russell E. Teague, 620 South Third St., Louisville 2.

MARYLAND: *Examination.* Baltimore, June 23-26. Sec., Dr. Frank K. Morris, 1211 Cathedral St., Baltimore 1.

MICHIGAN:* *Examination.* Ann Arbor and Detroit, June 8-10. Sec., Dr. E. C. Swanson, 118 Stevens T. Mason Bldg., West Michigan Ave., Lansing 8.

MINNEAPOLIS:* *Examination.* Minneapolis, April 21-23. *Reciprocity.* Minneapolis, April 23. Sec., Dr. F. H. Magney, 230 Lowry Medical Arts Bldg., St. Paul 2.

MISSISSIPPI: *Examination and Reciprocity.* Jackson, June 22-24. Sec., Dr. A. L. Gray, Old Capitol, Jackson 13.

MISSOURI: *Reciprocity.* Kansas City, April 6. *Examination.* St. Louis, May 29-30. Exec. Sec., Mr. John A. Hailey, Box 4, State Capitol Bldg., Jefferson City.

MONTANA: *Examination and Reciprocity.* Helena, April 7. Sec., Dr. Thomas L. Hawkins, 555 Fuller Ave., Helena.

NEBRASKA:* *Examination.* Omaha, June 15-17. Director, Mr. Husted K. Watson, Room 1009, State Capitol Bldg., Lincoln 9.

NEW JERSEY: *Examination.* Trenton, June 16-19. Sec., Dr. Royal A. Schaaf, 28 West State St., Trenton 8.

NEW MEXICO:* *Examination and Reciprocity.* Sante Fe, May 18-19. Sec., Dr. R. C. Derbyshire, 227 East Palace Ave., Santa Fe.

NEW YORK: *Examination.* New York, Rochester, Syracuse, Buffalo and Albany, June 23-26. Sec., Dr. Stiles D. Ezell, 23 S. Pearl St., Albany.

NORTH CAROLINA: *Endorsement.* Asheville, May 4. *Written. Examination and Endorsement.* Raleigh, June 15-18. Sec., Dr. Joseph J. Combs, 716 Professional Bldg., Raleigh.

NORTH DAKOTA: *Examination and Reciprocity.* Grand Forks, July 8-11. Sec., Dr. C. J. Glaspel, Box 228, Grafton.

OHIO: *Endorsement.* Columbus, April 7. *Examination.* Columbus, June 18-20. Sec., Dr. H. M. Platter, 21 West Broad St., Columbus 15.

OKLAHOMA:* *Examination.* Oklahoma City, June 2-3. Exec. Sec., Mrs. E. L. Haidek, 813 Braniff Bldg., Oklahoma City.

OREGON:* *Written.* Portland, Apr. 17-19. Ex. Sec., Mr. Howard I. Bobbitt, 609 Failing Bldg., Portland 4.

PENNSYLVANIA: *Examination and Endorsement.* Philadelphia and Pittsburgh, July 1-3. Sec., Mrs. Margaret G. Steiner, Box 911 Harrisburg.

RHODE ISLAND:* *Examination.* Providence, April 2-3. Administrator of Professional Education, Mr. Thomas B. Casey, 366 State Office Bldg., Providence.

SOUTH CAROLINA: *Reciprocity.* Columbia, May 12; *Examination.* Columbia, June 23-24. Sec., Dr. H. E. Jervey, Jr., 1829 Blanding St., Columbia.

SOUTH DAKOTA:* *Examination.* Sioux Falls, Aug. 25-26. Exec. Sec., Mr. John C. Foster, 300 First National Bank Bldg., Sioux Falls.

TEXAS:* *Examination and Reciprocity.* Fort Worth, June 22-24. Sec., Dr. M. H. Crabb, 1714 Medical Arts Bldg., Fort Worth 2.

UTAH: *Examination and Reciprocity.* Salt Lake City, July 810. Dir., Mr. Frank E. Lees, 324 State Capitol Bldg., Salt Lake City 1.

VIRGINIA: *Examination.* Richmond, June 18-20. *Endorsement.* Richmond, June 17. Address: Board of Medical Examiners, 631 First St., S. W., Roanoke.

WASHINGTON:* *Examination.* Seattle, July 13-15. Administrator, Mr. Thomas A. Carter, Capitol Bldg., Olympia.

WEST VIRGINIA: *Reciprocity and Endorsement.* Charleston, April 13. *Examination.* Charleston, June. Sec., Dr. Newman H. Syer, State Office Bldg., No. 3, Charleston 5.

WISCONSIN:* *Written.* Milwaukee, July 14-16. *Reciprocity.* Madison, April 17 and Milwaukee, July 15. Sec., Dr. Thomas W. Tormey, Jr., 1140 State Office Bldg., Madison.

WYOMING: *Examination and Reciprocity.* Cheyenne, June 1. Sec., Dr. Franklin D. Yoder, State Office Bldg., Cheyenne.

BOARDS OF EXAMINERS IN THE BASIC SCIENCES

ARKANSAS: *Examination.* Little Rock, May 4-5. Sec., Dr. S. C. Dellinger, University of Arkansas, Fayetteville.

COLORADO: *Examination.* Denver, May 6-7. Sec., Dr. Esther B. Starks, 1459 Ogden St., Denver 18.

CONNECTICUT: *Examination.* New Haven, June 6. Exec. Asst. Mrs. Regina G. Brown, 258 Bradley St., New Haven 10.

DISTRICT OF COLUMBIA: *Examination.* Washington, May 18-19. Address: Mr. Paul Foley, Deputy Director, 1740 Massachusetts Ave., N. W., Washington.

FLORIDA: *Examination.* Miami, June 6. Sec., Mr. M. W. Emmel, University of Florida, Box 340, Gainesville.

IOWA: *Examination.* Des Moines, April 14. Sec., Dr. Elmer W. Hertel, Wartburg College, Waverly.

KANSAS: *Examination.* Kansas City, June 2-3. Sec., Dr. L. C. Heckert, Pittsburg.

MICHIGAN: *Examination.* Ann Arbor and Detroit, May 8-9. Sec., Mrs. Anne Baker, West Michigan Ave., 116 Stevens T. Mason Bldg., Lansing.

MINNESOTA: *Examination.* Minneapolis, April 7-8. Sec., Dr. Raymond N. Bieter, 105 Millard Hall, University of Minnesota, Minneapolis.

NEBRASKA: *Examination.* Omaha, May 5-6. Director, Mr. R. K. Kirkman, Bureau of Examining Boards, 1009 State Capitol Bldg., Lincoln.

NEW MEXICO: *Examination.* Santa Fe, April 19. Sec., Mrs. Marguerite Cantrell, P. O. Box 1522, Santa Fe.

SOUTH DAKOTA: *Examination.* Vermillion, June 5-6. Sec., Dr. Gregg M. Evans, 310 East 15th St., Yankton.

TEXAS: *Examination.* Austin, Galveston, Houston, Apr. 17-18. Certificates issued by reciprocity and waiver on the first and fifteenth of each month. Sec., Bro. Raphael Wilson, 407 Perry-Brooks Bldg., Austin.

WASHINGTON: *Examination.* Seattle, July 8-9. Sec., Mr. Thomas A. Carter, Capitol Bldg., Olympia.

WISCONSIN: *Examination.* Madison, April 4. Final date for filing application was March 27. Milwaukee, June 6. Final date for final application is May 29. Sec., Mr. W. H. Barber, 621 Ransom St., Ripon.

*Basic Science Certificate required.

DEATHS

Ansanelli, Francis Cornelius, New York City; Georgetown University School of Medicine, Washington, D. C., 1932; specialist certified by the American Board of Psychiatry and Neurology; member of the American Academy of Neurology; veteran of World War II; associated with the New York Eye and Ear Infirmary, Bronx Eye and Ear Infirmary, and the Lenox Hill Hospital; consulting neurologist for the U. S. Public Health Service; died in the Neurological Institute Dec. 5, aged 53.

Bellamy, Robert Hartlee Ⓜ Wilmington, N. C.; Jefferson Medical College of Philadelphia, 1902; died Dec. 23, aged 77.

Berry, Thomas M. Ⓜ Eldorado, Okla.; Kentucky School of Medicine, Louisville, 1898; served as health officer of Okmulgee County; at one time superintendent of the Western Oklahoma Hospital in Supply; died Dec. 19, aged 84.

Cummins, John Biglow Ⓜ Fort Worth, Texas; University of Nashville (Tenn.) Medical Department, 1897; member of the American Academy of General Practice; in 1950 honored as "Doctor of the Year" in Tarrant County; member of the honorary staff of the Harris Hospital; died Dec. 31, aged 100.

Edwards, Thomas Burton, Cedar Hill, Mo.; St. Louis College of Physicians and Surgeons, 1909; died in St. Joseph Hospital, Kirkwood, Dec. 7, aged 84.

Evans, Albert Lee, Bonne Terre, Mo.; Barnes Medical College, St. Louis, 1900; veteran of World War I; on the staff of the Bonne Terre Hospital; died Dec. 29, aged 87.

Feldman, Joel William, Polk, Pa.; Columbia University College of Physicians and Surgeons, New York City, 1908; staff physician at the Polk State School; died Jan. 20, aged 73.

Ferguson, Allan Harvey Ⓜ Chicago; the Hahnemann Medical College and Hospital, Chicago, 1913; veteran of World War I; associated with the Illinois Masonic Hospital, where he was past-president of the medical staff; died in the Veterans Administration Research Hospital Jan. 19, aged 74.

Freyermuth, Otto George Ⓜ San Francisco; the Hahnemann Medical College and Hospital, Chicago, 1903; specialist certified by the American Board of Psychiatry and Neurology; member of the American Psychiatric Association; associated with the Hahnemann and Polyclinic hospitals; psychiatrist for the Criminal Courts in the San Francisco area; died Jan. 19, aged 82.

Gailey, Watson Ⓜ Bloomington, Ill.; born in Ashland, Sept. 7, 1882; College of Physicians and Surgeons of Chicago, School of Medicine of the University of Illinois, 1904; served on the faculty of the Illinois State Normal University; specialist certified by the American Board of Ophthalmology; past-president of the Central Illinois Society of Ophthalmology and Otolaryngology; member of the American Academy of Ophthalmology and Otolaryngology; fellow of the American College of Surgeons; in 1955 vice-chairman, Section on Ophthalmology, American Medical Association; veteran of World War I; medical consultant in India and Guatemala; founder and chief ophthalmologist at the Gailey Eye Clinic; on the staff of the Mennonite Hospital, where he was chief ophthalmologist, and where he died Jan. 19, aged 76.

Gately, George Lynde Ⓜ Revere, Mass.; Tufts College Medical School, Boston, 1918; formerly health commissioner of Boston; member of the American Academy of General Practice; served on the staffs of the Chelsea (Mass.) Memorial Hospital, Winthrop (Mass.) Community Hospital, and the Massachusetts General Hospital in Boston; died Jan. 7, aged 64.

Gentry, Jasper Leonard, Ava, Mo.; Memphis (Tenn.) Hospital Medical College, 1894; Barnes Medical College, St. Louis, 1899; died Dec. 27, aged 85.

Gerding, William John, Newport, Ky.; Medical College of Ohio, Cincinnati, 1897; also a graduate in pharmacy; associated with St. Elizabeth's Hospital, where he was past-president of the staff and where he died Jan. 22, aged 85.

Glover, Mervin Wilbur Ⓜ Arlington, Va.; George Washington University School of Medicine, Washington, D. C., 1932; interned at the George Washington University Hospital in Washington, D. C.; veteran of World War II; died Jan. 9, aged 51.

Griffeth, Frank William Ⓜ Elgin, Ill.; Chicago College of Medicine and Surgery, 1907; member of the staffs of the Sherman Hospital and St. Joseph Hospital, where he died Jan. 19, aged 78.

Haire, Robert Donnell Jr. Ⓜ Glendale, Calif.; Jefferson Medical College of Philadelphia, 1928; formerly associated with the U. S. Public Health Service;

Ⓜ Indicates Member of the American Medical Association.

veteran of World War II; on the staff of the Glendale Sanitarium and Hospital and the Memorial Hospital of Glendale; died Jan. 12, aged 54.

Hale, Joseph Grant, Big Clifty, Ky.; University of Louisville (Ky.) Medical Department, 1907; died in the Grayson County War Memorial Hospital in Leitchfield Nov. 24, aged 78.

Hammill, Hamilton Joseph, New York City; Georgetown University School of Medicine, Washington, D. C., 1931; associated with Fordham Hospital and the Union Hospital, where he died Jan. 21, aged 54.

Harris, John Aaron Ⓜ Webb, Miss.; University of Nashville (Tenn.) Medical Department, 1904; veteran of the Spanish–American War and World War I; died in Jackson Jan. 13, aged 85.

Harryman, William Klipstein Sr. Ⓜ Hackensack, N. J.; University of Virginia Department of Medicine, Charlottesville, 1919; fellow of the American College of Surgeons; veteran of World War I; on the staff of the Hackensack Hospital; died Jan. 13, aged 63.

Harwell, Robert Foster, Los Angeles; Meharry Medical College, Nashville, Tenn., 1936; died Jan. 5, aged 49.

Hawk, Alpha Fritz, Micco, Fla.; Ohio State University College of Homeopathic Medicine, Columbus, 1919; veteran of World Wars I and II; at one time practiced in Urbana, Ill., and served as president of the Champaign County Medical Society; formerly associated with the Veterans Administration Hospital in Jacksonville; died Dec. 16, aged 62.

Helff, Joseph Reuben Ⓜ Keene, N. H.; Jefferson Medical College of Philadelphia, 1914; served on the staff of the Holy Name Hospital in Teaneck, N. J.; died Jan. 8, aged 67.

Hendershot, Otto M., Columbus, Ohio; Baltimore Medical College, 1902; died Jan. 14, aged 90.

Henderson, John M., Williamsburg, Va.; Medical College of Virginia, Richmond, 1895; died Dec. 19, aged 90.

Henricke, Samuel George, Portland, Ore.; Long Island College Hospital, Brooklyn, 1920; specialist certified by the American Board of Pediatrics; member of the American Academy of Pediatrics; past-president of the North Pacific Pediatric Society; served as president of the medical staffs at Providence Hospital and Portland Sanitarium and Hospital; associated with Holladay Park and Emanuel hospitals; died Jan. 14, aged 62.

Hicks, Oliver Burdette Ⓜ Henderson, Texas; Atlanta College of Physicians and Surgeons, 1907; veteran of World War I; on the staff of the Henderson Memorial Hospital, where he died Jan. 9, aged 79.

Higdon, Edward Franklin, Lincoln, Neb.; University Medical College of Kansas City, 1899; veteran of World War I; served on the staffs of the Veterans Administration hospitals in Virginia and Wadsworth, Kan.; died Dec. 28, aged 83.

Higgins, John Henry Ⓜ Minneapolis; University of Minnesota College of Medicine and Surgery, Minneapolis, 1903; on the staff of the Asbury Hospital; died Dec. 31, aged 79.

Hill, William Edward, St. Louis; Meharry Medical College, Nashville, Tenn., 1920; a staff member of the Peoples Hospital; died Nov. 29, aged 63.

Hirshfield, Frank R. Ⓜ Minneapolis; University of Minnesota Medical School, Minneapolis, 1921; associated with Doctors Memorial and St. Mary's hospitals; medical director of the Mutual Service Insurance Company; died in the Doctors Memorial Hospital Dec. 16, aged 64.

Hix, Nicholas F. Ⓜ Wise, Va.; University of Virginia Department of Medicine, Charlottesville, 1900; county coroner for many years; died in Bluefield Jan. 1, aged 82.

Hopkins, James Columbus, Hopkinsville, Ky.; Meharry Medical College, Nashville, Tenn., 1917; died Jan. 19, aged 72.

Hosp, Paul Herman Ⓜ Sparta, N. J.; Long Island College Hospital, Brooklyn, 1913; emeritus staff member of Presbyterian Hospital and Martland Medical Center in Newark, where he served on the staffs of St. Michael's and the Babies Hospital–Coit Memorial; died Jan. 20, aged 71.

Hostetter, Robert D. Ⓜ Dayton, Ohio; Jefferson Medical College of Philadelphia, 1916; fellow of the American Academy of Pediatrics; veteran of World War I; on the staff of the Barney Convalescent Hospital; member and once chief of staff at the Miami Valley Hospital, where he died Jan. 12, aged 64.

Hubbard, Isaac George Ⓜ Manson, Wash.; St. Louis University School of Medicine, 1907; died in Chelan Jan. 3, aged 80.

Huff, John Harison, Cosby, Tenn. (licensed in Tennessee in 1903); veteran of World War I; once was a member of the school board; died in Newport Jan. 1, aged 84.

Hughes, Robert Lee Ⓜ Bartow, Fla.; Atlanta Medical College, 1892; past-president of the Polk County Medical Society; formerly practiced in Anniston, Ala., where he was health officer of Calhoun County; served as a member of the state board of health; president emeritus of Bartow Federal Savings & Loan Association; honorary chairman of the board of directors of Citrus and Chemical Bank of Bar-

tow; a charter member and past-vice-president of the Kiwanis Club; honorary staff member of the Bartow Memorial Hospital; died Jan. 6, aged 88.

Hutchins, Clarence Lisle Ⓜ Delta, Ohio; Toledo Medical College, 1908; fellow of the American College of Surgeons; formerly county health commissioner; on the staff of the Detwiler Memorial Hospital; president of the Peoples Savings Bank Company; died in the Toledo (Ohio) Hospital Jan. 11, aged 73.

Jack, Myrtle M., Titusville, Pa.; University of Pittsburgh School of Medicine, 1910; died Dec. 28, aged 84.

Jackson, Fred Douglas, Anniston, Ala.; Meharry Medical College, Nashville, Tenn., 1914; on the staff of the Anniston Memorial Hospital; died Jan. 7, aged 69.

Jameson, Jane Ⓜ Castro Valley, Calif.; University of Wisconsin Medical School, Madison, 1948; specialist certified by the American Board of Anesthesiology; member of the American Society of Anesthesiologists; served on the staff of the Eden Hospital; died Jan. 20, aged 35.

Jennings, James Francis, Chrisman, Ill.; Starling Medical College, Columbus, Ohio, 1894; served in France during World War I; died in the Paris (Ill.) Hospital Jan. 17, aged 88.

Johnston, James Harvey, San Francisco; Medical Department of the University of California, San Francisco, 1907; died Jan. 2, aged 89.

Jones, Laurence Ⓜ Beverly Hills, Calif.; Columbia University College of Physicians and Surgeons, New York City, 1919; formerly practiced in Kansas City, Mo., where he was associated with the Menorah Hospital; author of "The Postural Complex: Observations as to Cause, Diagnosis and Treatment"; affiliated with Midway Hospital and the Cedars of Lebanon Hospital in Los Angeles, where he died Jan. 5, aged 63.

Jones, Thomas Jefferson, Marion, Ala.; Birmingham Medical College, 1915; served as state senator; died in Selma Jan. 5, aged 72.

Kahle, I. Dana Ⓜ Knox, Pa.; College of Physicians and Surgeons, Baltimore, 1905; served as state representative and state senator; company surgeon for the Baltimore and Ohio Railroad; on the staff of the Oil City (Pa.) Hospital, where he died Jan. 1, aged 83.

Kanter, Aaron Jack Ⓜ Cincinnati; University of Cincinnati College of Medicine, 1934; member of the American College of Chest Physicians; associated with the Jewish and Veterans Administration hospitals; died Jan. 12, aged 49.

Kaufman, Cloid E. Ⓜ Tyrone, N. M.; Chicago Homeopathic Medical College, 1903; died in Silver City Jan. 14, aged 79.

Keene, Fred Floyd Ⓜ Wessington Springs, S. D.; Sioux City (Iowa) College of Medicine, 1908; past school board member, city councilman, justice of peace, and county health officer; veteran of World War I; died in the Royal C. Johnson Hospital in Sioux Falls Jan. 18, aged 80.

King, Gordon Rogers Ⓜ New York City; Howard University College of Medicine, Washington, D. C., 1937; interned at Freedmen's Hospital in Washington, D. C., where he served a residency; died Jan. 21, aged 50.

Kitchell, William Everett Ⓜ St. Clair, Mo.; American Medical Missionary College, Battle Creek, Mich., and Chicago, 1903; died in St. Francis Hospital, Washington, Dec. 20, aged 80.

Knowles, Henry Blaine Ⓜ Anna, Ill.; St. Louis University School of Medicine, 1911; formerly associated with the Peoria (Ill.) State Hospital, Anna (Ill.) State Hospital, Illinois Training School for Boys in St. Charles, and the Dixon (Ill.) State School; died Jan. 24, aged 74.

Landry, Paul Bernard, Port Allen, La.; Medical Department of Tulane University of Louisiana, New Orleans, 1904; West Baton Rouge Parish Coroner; served as mayor of Port Allen, member of the Port Allen Town Council, sheriff of West Baton Rouge, and state representative from that parish; chairman, advisory board, East Louisiana State Hospital in Jackson; associated with the Plaquemine (La.) Sanitarium and Our Lady of the Lake Hospital, where he died Jan. 15, aged 78.

Landsborough, Arnold Muir, Garrettsville, Ohio; University of Toronto Faculty of Medicine, Toronto, Ont., Canada, 1925; died Dec. 5, aged 61.

Lawler, Frank John, Minneapolis; University of Minnesota College of Medicine and Surgery, Minneapolis, 1912; for many years associated with the Veterans Administration Hospital; died Dec. 4, aged 68.

Lawson, Edward Kirby Sr., Harrisburg, Pa.; Temple University School of Medicine, Philadelphia, 1911; fellow of the American College of Surgeons; past president of the Dauphin County Medical Society; formerly associated with the Harrisburg Polyclinic Hospital; served as physician and surgeon for Dauphin County Prison; died Jan. 8, aged 72.

Leader, George Howard Ⓜ Penn Yan, N. Y.; Kentucky University Medical Department, Louisville, 1906; veteran of World War I; on the staff of the Soldiers and Sailors Memorial Hospital; past-president of the Rotary Club; died Jan. 4, aged 76.

Lee, Norman Leon Ⓜ Philadelphia; Howard University College of Medicine, Washington, D. C., 1932; cited by the government for services to the U. S. Selective Service System; died Jan. 11, aged 55.

L'Esperance, Elise Strang Ⓜ Pelham Manor, N. Y.; Woman's Medical College of the New York Infirmary for Women and Children, New York City, 1899; for many years associated with the Cornell University Medical College in New York City, where she joined the faculty in 1910; past-president of the American Medical Women's Association; fellow of the New York Academy of Medicine; member of the American Association of Pathologists and Bacteriologists, New York Pathology Society, Harvey Society, and the American Radium Society; she and her sister founded the Strang Cancer Prevention Clinic in memory of their mother; a founder and head of the Kate Depew Strang Cancer Prevention Clinic and for many years on the staff of the New York Infirmary for Women and Children; head of a similar clinic, on the staff, and on the board of managers of the Memorial Center for Cancer and Allied Diseases; served as pathologist at the New York Hospital and the Harlem Hospital in New York City; formerly an associate commander of the Women's Field Army of the American Society for the Control of Cancer; in 1942 was presented with the Clement Cleveland Medal, awarded annually by the New York City Cancer Committee "for outstanding contributions to cancer control work;" received a medal, the 1946 award of the American Women's Association; won the 1951 Lasker Award of the American Public Health Association; consulting editor of the *Journal of the American Medical Women's Association;* died Jan. 21, aged 83.

Litterer, Ammon Buist Ⓜ Coral Gables, Fla.; Vanderbilt University School of Medicine, Nashville, Tenn., 1923; clinical assistant professor of dermatology at the University of Miami School of Medicine; veteran of World War II; specialist certified by the American Board of Dermatology and Syphilology; member of the American Academy of Dermatology and Syphilology; associated with St. Francis Hospital in Miami Beach and the Jackson Memorial and Victoria hospitals in Miami; died Jan. 1, aged 61.

Lord, Morris Sheldon, Schenectady, N. Y.; Syracuse University College of Medicine, 1890; veteran of the Spanish–American War; on the honorary staff of the Ellis Hospital, where he died Dec. 30, aged 91.

McConnaughy, James Barth Ⓜ New Kensington, Pa.; University of Pittsburgh School of Medicine, 1918; veteran of World War I; member of the Industrial Medical Association; medical director since 1922 of the New Kensington Works of Aluminum Company of America; on the staff of the Citizens General Hospital, where he died Jan. 7, aged 65.

McKowen, John Ⓜ Baton Rouge, La.; Medical Department of Tulane University of Louisiana, New Orleans, 1912; veteran of World Wars I and II; fellow of the American College of Surgeons; affiliated with Our Lady of the Lake Hospital and Baton Rouge General Hospital, where he died Jan. 4, aged 69.

Martindale, Elihu Arthur Ⓜ Hillsdale, Mich.; University of Michigan Department of Medicine and Surgery, Ann Arbor, 1899; died in the Foote Memorial Hospital, Jackson, Jan. 1, aged 88.

Magee, Chester Lea, Carmel, Calif.; Johns Hopkins University School of Medicine, Baltimore, 1899; veteran of World War I; consulting physician for the Southern Pacific Railroad; died Jan. 2, aged 88.

Maglio, Murrill Willis, Lepanto, Ark.; Kansas City (Mo.) College of Medicine and Surgery, 1925; veteran of World War I; died in the Veterans Administration Hospital in Kansas City, Mo., Jan. 21, aged 61.

Mason, Robert Macon Ⓜ Murray, Ky.; Vanderbilt University School of Medicine, Nashville, Tenn., 1912; affiliated with the Murray Hospital, formerly the Mason Memorial Hospital, of which he was co-founder; a charter member of the Rotary Club; died in the Murray Hospital Jan. 14, aged 70.

Maxwell, Paul Ⓜ Mount Union, Pa.; Medico-Chirurgical College of Philadelphia, 1916; past-president of the Huntingdon County Medical Society; on the courtesy staff of the J. C. Blair Memorial Hospital at Huntingdon; past-president of the Mount Union Rotary Club; died Jan. 1, aged 65.

Mays, William Clifford Ⓜ Stanaford, W. Va.; University of Louisville (Ky.) Medical Department, 1911; veteran of World War I; physician for the New River Coal Company; died Jan. 11, aged 72.

Mercurio, Pasquale James Ⓜ Brooklyn; Boston University School of Medicine, 1937; veteran of World War II; associated with the Norwegian Hospital and the Shore Road Hospital, where he died Jan. 10, aged 46.

Merrill, William Orville Ⓜ Detroit; University of Michigan Homeopathic Medical School, Ann Arbor, 1909; veteran of World War I; for many years chief of the eye, ear, nose and throat department at Highland Park (Mich.) General Hospital; died in the Harper Hospital Jan. 6, aged 73.

Miller, Irvin, New Rochelle, N. Y.; University of Maryland School of Medicine and College of Physicians and Surgeons, Baltimore, 1939; certified by the National Board of Medical Examiners; specialist certified by the American Board of Obstetrics and Gynecology, fellow of the American College of Surgeons; served on the staffs of the New York Polyclinic Medical School and Hospital and the New York Post-Graduate Medical School, New York City; on the staffs of the Lincoln Hospital in New York City and the New Rochelle Hospital, where he died Jan. 26, aged 44.

Miller, Joseph Samuel, Scarsdale, N. Y.; University of Illinois College of Medicine, Chicago, 1933; interned at the Cook County Hospital in Chicago; specialist certified by the American Board of Psychiatry and Neurology; member of the American Psychoanalytic Association, American Psychosomatic Society, and the American Psychiatric Association; veteran of World War II; on the staffs of the White Plains (N. Y.) Hospital and the New York Psychoanalytic Institute; died Jan. 16, aged 49.

Moorer, William M. Ⓜ Lodge, S. C.; Medical College of South Carolina, Charleston, 1904; chairman of the school board; served as mayor; died in the Colleton County Hospital, Walterboro, Jan. 5, aged 78.

Morris, Roger Sylvester Jr. Ⓜ Ludington, Mich.; University of Chicago, The School of Medicine, 1940; interned at the Henry Ford Hospital in Detroit, where he served a residency; formerly a resident at the Presbyterian Hospital in Chicago and the University of Chicago Clinics; served as assistant professor of medicine at his alma mater; veteran of World War II; died Dec. 30, aged 47.

Muller, Robert Anthony, New York City; born in Carlsbad, Austria, May 18, 1895; Deutsche Universität Medizinische Fakultät, Prague, Czechoslovakia, 1921; specialist certified by the American Board of Physical Medicine and Rehabilitation; member of the American Rheumatism Association and the American Society of Physical Medicine and Rehabilitation; on the faculty of Columbia University College of Physicians and Surgeons; served as director of physical medicine at St. Barnabas, Columbus, and St. Giles hospitals, and the Presbyterian Home; associated with the Presbyterian Medical Center, Lenox Hill and Mount Sinai hospitals, and the Hospital for Joint Diseases; director of physical medicine at St. Luke's Hospital, where he died Jan. 12, aged 63.

Myers, Jacob Ⓜ Sherman Oaks, Calif.; Rush Medical College, Chicago, 1905; served on the faculty of his alma mater; fellow of the American College of Surgeons; formerly practiced in Chicago, where he was on the staff of the Woodlawn Hospital and connected with the Spalding School for Crippled Children; died Jan. 19, aged 75.

Noyes, Edmund Francis Ⓜ Dixon, Wyo.; University of Denver Medical Department, 1897; died in the Memorial Hospital, Craig, Colo., Dec. 31, aged 90.

O'Brien, Joseph Michael, Pittsburgh; Loyola University School of Medicine, Chicago, 1930; veteran of World War II; associated with the Pittsburgh Hospital; for many years county school physician; died Jan. 9, aged 58.

O'Connell, William Michael Ⓜ Nutley, N. J.; George Washington University School of Medicine, Washington, D. C., 1938; veteran of World War II; associated with the Hudson County General Hospital in Secaucus, Berthold S. Pollak Hospital for Chest Diseases in Jersey City, and St. Mary's Hospital in Hoboken; died in the New York Hospital in New York City Jan. 12, aged 46.

Osgood, Frederick Luke Ⓜ Saxtons River, Vt.; born in 1872; University of Vermont College of Medicine, Burlington, 1894; a member of the state board of mental health, on which he served for the past 35 years; served on the Rockingham Board of School Directors for many years; a justice of the peace of the town of Rockingham for 24 years; on Nov. 14, 1954, the state of Vermont dedicated the "Osgood Building" at the Vermont State Hospital in Waterbury in his honor; representative of Rockingham to the legislature from 1917 to 1923 and senator of Windham County from 1921 to 1929; an honorary member of the medical staff at Rockingham Memorial Hospital in Bellows Falls; since 1939 a director of the Bellows Falls Trust Company; died Jan. 10, aged 86.

Parks, Arthur Arnold, Crafton, Pa.; Western Pennsylvania Medical College, Pittsburgh, 1901; president of the Crafton Board of Health; served on the staffs of the Southside and Allegheny General hospitals in Pittsburgh; died in Pittsburgh Jan. 3, aged 81.

Peterson, Norman Vern Ⓜ Rye, N. Y.; George Washington University School of Medicine, Washington, D. C., 1922; specialist certified by the American Board of Otolaryngology; member of the American Academy of Ophthalmology and Otolaryngology and the American Laryngological, Rhinological and Otological Society; emeritus director of the eye, ear, nose and throat department at the United Hospital in Port Chester; died in Avon Park, Fla., Jan. 15, aged 67.

Prichard, Horace De Witt Ⓜ Wichita Falls, Texas; University of Texas School of Medicine, Galveston, 1917; fellow of the American College of Surgeons; honorary member of the staff, Wichita General Hospital; veteran of World War I; died Jan. 9, aged 69.

Quinn, Raymond James Ⓜ Waterbury, Conn.; College of Physicians and Surgeons, Baltimore, 1913; veteran of World War I; served as city bacteriologist and welfare department physician; associated with St. Mary's Hospital, where he died Jan. 13, aged 66.

Riecker, Herman Harlan, Ann Arbor, Mich.; Johns Hopkins University School of Medicine, Baltimore, 1923; specialist certified by the American Board of Internal Medicine; fellow of the American College of Physicians; member of the American Society of Clinical Investigation; veteran of World War I; past-president of the Washtenaw County Medical Society; for many years on the faculty of the University of Michigan Medical School; on the staff of St. Joseph Mercy Hospital, where he died Jan. 4, aged 63.

Robertson, Jarratt Padgett Ⓜ Birmingham, Ala.; Vanderbilt University College of Medicine, Nashville, Tenn., 1923; specialist certified by the American Board of Urology; member of the American Urological Association and past-president of the Southeastern section; associate professor of urology at the Medical College of Alabama; associated with South Highland Infirmary, Crippled Children's Clinic Hospital, University Hospital, and St. Vincent's Hospital; died in the South Highland Infirmary Jan. 17, aged 60.

Ross, Thomas Trigg Ⓜ Gurdon, Ark.; Tulane University School of Medicine, New Orleans, 1928; health officer of Clark County; specialist certified by the American Board of Preventive Medicine; for many years state health officer; died Jan. 1, aged 60.

Scales, John Perkins Ⓜ Livingston, Ala.; Louisville (Ky.) Medical College, 1897; past-president of the Sumter County Medical Society; veteran of the Spanish–American War and World War I; served as physician to Livingston State College from 1930 to 1946; formerly county health officer; for many years surgeon for the Southern Railway; died in the Veterans Administration Hospital, Tuscaloosa, Dec. 30, aged 87.

Sheldon, Edward Schock, Ewan, N. J.; Hahnemann Medical College and Hospital of Philadelphia, 1895; for many years practiced in Collingswood, where he was first health officer and organized the board of health; for many years attending physician at the Methodist Home for Aged in Collingswood; president of the first Collingswood Bank and member of the board of health; one of the founders and formerly on the staff of the West Jersey Hospital in Camden, where he died Dec. 20, aged 84.

Smith, Lester Alvin Ⓜ Indianapolis; Rush Medical College, Chicago, 1916; specialist certified by the American Board of Radiology; member of the American Roentgen Ray Society and Radiological Society of North America; fellow of the American College of Radiology; associate professor of radiology at the Indiana University School of Medicine; veteran of World War I; member of the staffs of Methodist, St. Vincent's, and Indianapolis General hospitals; died Dec. 15, aged 68.

Speicher, George Franklin Ⓜ Somerset, Pa.; Baltimore Medical College, 1910; for many years a member of the school board of Rockwood, where he was a director of the Union National Bank and the Coal Operators Casualty Company; associated with the Somerset Community Hospital and the Somerset State Hospital; died Dec. 25, aged 75.

Stoughton, Arthur Volney Ⓜ Claremont, Calif.; Ohio Medical University, Columbus, 1898; served on the faculty of the Pomona College, where he was college physician; first president of the Pomona College Alumni Association; died Dec. 26, aged 86.

Summers, William Boyd Ⓜ Casper, Wyo.; University of Colorado School of Medicine, Denver, 1951; interned at Mount Sinai Hospital in Miami Beach, Fla.; served a residency at the Veterans Administration Hospital in Denver; on the staff of the Memorial Hospital of Natrona County; died in Denver Dec. 1, aged 32.

Wells, William Albert Jr., Washington, D. C.; Howard University College of Medicine, Washington, 1907; also a graduate in law and pharmacy; served on the faculty of his alma mater; died in Washington Hospital Center Dec. 19, aged 85.

FOREIGN LETTERS

AUSTRIA

Cerebral Lipoidoses.—At the meeting of the Austrian Pediatrics Society in January, Dr. H. F. Seitelberger said that cholesterol thesaurismosis, phosphatide thesaurismosis, amaurotic idiocy, lipochondrodystrophy, and lipid histiocytosis are essentially endogenous cellular enzyme disturbances in the metabolic chains of the sphingolipoids: ganglioside, cerebroside, and sphingomyelin. The blockage of certain enzymatic reactions leads to pathological storage of certain substances within the cells. The storage or accumulation of a certain lipoid in each case is caused by the blockage of a distinct enzymatically regulated reaction within the metabolic chain of the sphingolipoids. In lipochondrodystrophy, the most frequent of this group of diseases, not only is ganglioside stored in the cells of organs, but also the mucopolysaccharide-lipoid complex. The disturbance responsible for this storage is to be found at a connecting point of the lipoid and polysaccharide metabolism. It is characteristic of lipid histiocytosis that cerebroside storage takes place exclusively in the reticulohistiocytic system, that is, in the brain it takes place only in the periadventitia of the vessels. The speaker stated that the anatomic differences between the infantile, late infantile, adolescent, and other forms of amaurotic idiocy are to be found in the degree of penetrance of the existing genetic enzyme disturbance. In the presence of a gene mutation of high penetrance, the disease will begin early and will be severe and short. The postinfantile forms with lesser penetrance are of longer duration, and the lesions in the brain are less severe, have local fluctuations in intensity, and show characteristics pointing to the manifestation of vital cellular reactions to the disease process.

In commenting on this report, Dr. H. H. Gross, of the Neurohistological Laboratory of the Mental Hospital of Vienna, stated that so far studies were made on 546 brains of patients in whom severe imbecility had been diagnosed as either congenital or acquired in early childhood. Contrary to expectation, the percentage of patients with cerebral lipoidoses was small. Only five cases of lipochondrodystrophy and three of amaurotic idiocy were found. He admitted, however, that whereas the clinical diagnosis of lipochondrodystrophy, thanks to its characteristic physical symptoms, causes no difficulties, the recognition of the various forms of amaurotic idiocy is still difficult, particularly if the patient has no history of a familial tendency.

BELGIUM

Lysosomes.—At a meeting of the Medical Academy Dr. De Duve of Louvain stated that lysosomes were first recognized in the liver. They are corpuscles with a diameter slightly smaller than half a micron, and contain an enzyme in a lipoprotein casing. They act only in an acid environment and only after the rupture of the protective casing. They have been detected in the kidney also, where they seem to be indistinguishable from particles recognized by Gerard and Cordier as having the power of phagocytosis. The role of the lysosomes is still unknown but it is believed that they may play a part in autodigestive and degenerative phenomena.

Hiatal Hernia.—At a meeting of the Belgian Society of Gastroenterology a symposium on hiatal hernia was presented. This condition was attributed to such factors as old age, obesity, abdominal hypertension, endocrine disturbances, and pregnancy. Le Cluyse of Brussels reported a series of 36 patients and concluded that the incidence of hiatal hernia could not be accurately determined because many patients are asymptomatic. The associated pain may be due to esophagitis, esophageal reflux, or incarceration of the hernia. Operation is indicated for acute hemorrhage of the upper gastrointestinal tract and constant or recurrent pain. Medical treatment is only palliative. The speaker stressed the diagnostic value of gastroscopy in these patients.

Deloyers and van der Stricht emphasized the necessity of evaluating the surgical treatment of hiatal hernias. Correction of the anatomic defect should relieve symptoms and restore normal functions. The speakers preferred a modification of Allison's technique. Deloyers emphasized the importance of team work by the internist, gastroenterologist, cardiologist, roentgenologist, and surgeon. Recurrences are seen in about 10% of those operated on. This is because of the friability of the tissues of this region.

CHILE

Penicillin and Rheumatic Heart Disease.—An investigation of the effect of penicillin on acute rheumatic fever and valvular heart disease was undertaken in the Jose Joaquin Aguirre and Roberto del Rio hospitals of Santiago, under the

sponsorship of the Commission on Streptococcal Diseases, U. S. Armed Forces Epidemiological Board, the Western Reserve University School of Medicine, the University of Chile, and the Chilean National Health Service. The results of the first year of the study were reported by Mortimer and co-workers (*Revista médica de Chile*, vol. 87, 1959). In this series of 97 patients with acute rheumatic fever, 49 received large doses of penicillin for six weeks, and 48 controls received no antibiotic. The penicillin appeared to have no effect on the acute clinical, laboratory, and electrocardiographic manifestations of the disease but did reduce the incidence of valvular heart disease; 52% of the control group exhibited valvular disease one year after the acute attack as compared to only 21% of those who received penicillin. The disparity between the effects on the acute manifestations and those on endocardial lesions suggests two pathogenetically different processes. The observed effects of penicillin indicate that valvular heart disease may depend in part on a continuing stimulus from living streptococci, even after the symptoms of rheumatic fever have disappeared. It is concluded that an intensive course of penicillin is justified as a preventive of valvular heart disease.

Health Progress.—According to the Yearbook of Causes of Deaths of the Department of Vital Statistics, there has been a great progress in the lowering of the death rate in the 10 years, from 1948 to 1957. The crude death rate dropped from 16.9 to 13.7 deaths per 1,000. The infant mortality (deaths under one year of age) decreased from 145.9 to 117.7 deaths per 1,000 live births in the same period. This is still much too high. In the same period the crude birth rate increased from 35.9 to 38.4 births per 1,000 population. A new maternal health law provides payments for mothers from the sixth month of pregnancy on if they accept treatment by the Mother and Child Welfare Department of the National Health Service.

FRANCE

Irradiation and Marrow Transplantation for Leukemia.—Prof. J. Bernard and Dr. G. Mathé, with a team of doctors at the Hospital St. Louis in Paris, treated a 13-year-old girl with acute leukemia by a combination of irradiation and injections of bone marrow from human donors. Although the method had been used experimentally in mice, this was the first human patient to be so treated. The trial was made as a result of the information obtained from the treatment in Paris of six Yugoslav scientists who accidentally received lethal or near-lethal doses of radiation from an experimental atomic reactor. They were saved by human marrow transfusions. These would normally be rejected owing to the formation of antibodies in the host, but irradiation just before the transfusion prevents this process. The girl was irradiated by exposure to 300 r from a cobalt bomb. This served the double function of destroying the leukemia cells and inhibiting the formation of bone marrow antibodies. Four transfusions of bone marrow from healthy donors were then given. The blood count returned to normal within a month. When last seen the girl was continuing to improve.

INDIA

Vitamin Deficiency and Gestoses.—Pai and Pate (*Indian Journal of Medical Research*, vol. 46, September, 1958) studied the relationship between thiamine, riboflavin, and niacin deficiency and the occurrence of toxemia of pregnancy. The excretion of thiamine, riboflavin, and niacin in toxemic patients was studied in 24-hour urine specimens before and after delivery. A test dose of 5 mg. each of thiamine and riboflavin and 50 mg. of niacin was given orally and the excretion of the respective vitamins was estimated. The urine specimens were collected on the 1st, 2nd, 5th, 6th, 10th, and 11th days after delivery and the results compared with those in normal subjects and in normal pregnancy. A deficiency in thiamine was found in the toxemic patients. This decreased after the test dose. The recovery was manifested clinically by the disappearance of edema and albuminuria and a gradual reduction in blood pressure.

The thiamine return after the test dose in patients whose pregnancy was normal was much lower than that in the nonpregnant control group. The dietary intake was 0.7 mg. of thiamine, 0.6 mg. of riboflavin, and 6 mg. of niacin daily, while in those with normal pregnancy these values were 0.85, 0.8, and 7 mg. respectively. There was no correlation between the dietary intake and the urinary excretion of these vitamins in toxemia or normal pregnancy. The percentage return of thiamine after the test dose in toxemias of pregnancy studied on 1st-2nd, 5th-6th, and 10th-11th days was significantly lower than that in the nonpregnant group, thus showing a state of unsaturation with regard to thiamine. Low values for riboflavin were obtained only in the first-second-day period, showing that unsaturation here existed only during this period, while no state of unsaturation was revealed with regard to niacin.

Action of Hormones on Involuntary Muscles.—A. P. Sharma (*Indian Journal of Medical Research*, vol. 46, September, 1958) stated that epinephrine, acetyl choline, and histamine are widely liberated in the body and play a vital role in regulating tissue functions by virtue of their local actions. These actions have been studied mainly on cardiac and

involuntary muscles where they produce motor or inhibitory effects which vary in different animals, in different systems, and in the same system at different sites. Dual effects (both stimulation and inhibition of the same tissue) have also been observed. The activity of involuntary muscles is also influenced by the concentration of sodium, potassium, and calcium ions in body fluids. The author therefore studied the mechanism of these local hormones and the role of electrolytes, if any, in this mechanism. Experiments were conducted on the involuntary muscles of the isolated small intestine of rabbits. Epinephrine had an inhibitory effect under aerobic conditions, which was changed to stimulation under anaerobic conditions by previous treatment with acetyl choline, atropine, and potassium chloride. Sodium or calcium chlorides did not affect its action. Acetyl choline produced a stimulation under both aerobic and anaerobic conditions which was changed to inhibition by previous treatment with epinephrine, sodium chloride, and calcium chloride. With potassium chloride, stimulation was produced under both aerobic and anaerobic conditions.

Atropine in all concentrations and under both aerobic and anaerobic conditions inhibited the small intestine after preliminary stimulation. Stimulation was, however, produced after previous treatment with calcium chloride, though the antagonizing action to acetyl choline was retained. The stimulating action of histamine was changed to inhibition by previous treatment with atropine, calcium chloride, or potassium chloride. Sodium and potassium caused stimulation of intestinal activity; after previous treatment with the other electrolyte, stimulation was replaced by inhibition. Acetyl choline changed the inhibitory action of sodium and potassium chloride into stimulation. Epinephrine enhanced the inhibitory action of both. Calcium chloride caused a depressant action which was reversed by previous treatment with atropine. Thus it was seen that the effects of these local hormones and electrolytes varied, depending on the previous state of the intestine, and changed with changes in the electrolyte concentration of the surrounding fluid and also previous treatment with some other hormone. Most of them could produce either stimulation or inhibition. The different actions of these hormones in different sites and different species may be due to the different environmental conditions present at the time. This may possibly explain the different actions of local hormones on the involuntary muscles in different regions.

Urinary Excretory Patterns, Glucose Tolerance, and Shock Therapy.—N. G. Srinivasan and co-workers (*Indian Journal of Medical Research*, vol. 46, September, 1958) studied the urinary excretion of amino acids and the glucose tolerance of catatonic schizophrenic patients before and after electroconvulsive therapy. Urine samples were collected prior to the shock treatments, on days subsequent to the 7th and 10th treatments, and on the 5th and 10th days after termination of shock treatment. A marked fall in the excretion of most of the amino acids after the seventh shock was seen. With subsequent shocks there was a slight tendency for these values to rise but they never came back to the original level. The low values were maintained for some time even after termination of the therapy. Particularly low levels were obtained for glutamic acid, glycine, threonine, and aspartic acid. The glucose tolerance and other biochemical studies were also made prior to the shock treatments, after the 1st, 4th, 7th, and 10th treatments, and on the 4th, 7th, and 10th days after termination of the shock treatment. The total proteins, albumin, and potassium levels showed a significant rise, returning gradually to normal after the last electroconvulsive shock. The two-hour glucose values after shock were higher than the preshock values. The inorganic phosphate levels showed a significant fall corresponding to the levels of glucose, showing their utilization in the metabolism of glucose. Both tended to return to fasting levels after termination of the shock therapy, particularly on the 10th day after this termination.

Vitamin B_{12} and Nitrogen Metabolism.—B. D. Punekar (*Current Medical Practice*, vol. 2, December, 1958) studied the effect of vitamin B_{12} on the digestibility coefficient and nitrogen retention in rats. Male weanling albino rats distributed into two groups according to their body weights were served a corn and soy bean diet adequate in all vitamins except vitamin B_{12}. One group received this vitamin by injection in a daily dose of 0.2 mcg. for four weeks. A higher growth response was noticed in the group receiving vitamin B_{12}, suggesting a specific function for this vitamin in anabolism. These rats gained in weight much more rapidly than those without the vitamin. The digestibility coefficient did not show any significant difference in the two groups but a marked difference was seen in the amount of nitrogen retained in the presence of vitamin B_{12}, a much higher retention of nitrogen being noticed with its administration.

Meeting of Public Health Association.—At the third annual meeting of the Indian Public Health Association in Calcutta in December, Dr. Das Gupta criticized the meager expenditure on health under the First Plan. The problem of nonavailability of trained personnel could be solved if language or customs were not considered insuperable barriers to employment and service. Although scientific investigation for better control of tuberculosis is being made, scant attention has been paid to rehabilitating patients cured of tuberculosis. The control of leprosy, cholera, and smallpox must be undertaken

on a national scale. Referring to such virus diseases as poliomyelitis and encephalitis, he said that each State Directorate should have a trained epidemiologist. There should be a central laboratory in each state provided with a virology unit. A midday meal should be provided for children in schools. More attention should be given to mental disorders. Finally, a medical section must be attached to each factory for the care of the workers.

Rupture of the Uterus.—N. S. Devi (*Current Medical Practice*, vol. 2, December, 1958) observed 41 cases of uterine rupture in 17,882 deliveries. This high incidence was due to inadequate facilities for antenatal care, most of these accidents occurring in the patients' homes, the distance between the home and the hospital in some cases being 75 miles. Only one patient in the series had had antenatal attention. Most patients were under 30 years of age, the youngest being 16 and the oldest 35. There was only one primigravida in this series, the parity varying between two and nine. Of the multiparous women in this series six had an otherwise normal labor when the accident occurred. Dystocia accounted for 18 of the cases. The labor was not prolonged in all these cases, its duration varying from 2 to 48 hours. Preexisting scars in the uterus accounted for nine cases. Three were due to excessive penetration by chorionic elements. There were five cases of traumatic deliveries in which internal podalic version was performed; the labor was prolonged and there was excessive retraction of the uterus over the fetus. Six multiparas had a normal vertex presentation and the rupture was at the cervicovaginal junction. Previous labors had been uneventful. The site of rupture was the lower uterine segment in 19 patients, the upper uterine segment in 9, the broad ligament in 7, and there was colporrhexis in 6. There were 18 maternal deaths (44% mortality) and 38 fetal deaths (92.7% mortality). Eight died before treatment could be given, 1 was given conservative treatment because she was unfit for surgery, and 32 were given total or subtotal hysterectomy.

Hypothermia in Cardiovascular Surgery.—Padhi and Nanson (*Journal of the Indian Medical Association*, vol. 31, Dec. 1, 1958) performed cardiovascular operations on 10 patients under hypothermia; 7 of these had atrial septal defect with marked shunts, 8.3 to 13.1 liters per minute passing through the defect, mainly left to right; 1 had a pulmonic stenosis and was operated on under direct vision; and 2 had aortic insufficiency of rheumatic origin. Here hypothermia was used as an adjunct, and was thought to give an added margin of safety. These two patients were cooled to 32 C and the aorta was clamped for 12 and 7 minutes respectively. For the patients with auricular septal defects, the time of circulatory interruption varied from 2.5 to 10 minutes and for the patient with pulmonary stenosis, the circulation was interrupted for 2.5 minutes. The rectal temperature during circulatory interruption varied from 28 to 32 C (82.4 to 89.6 F). All patients recovered.

NEW ZEALAND

Fee-for-Service Scheme for Medical Care.—The supplement to the *British Medical Journal* of Feb. 14 contains an article by A. W. S. Thompson, director of the division of clinical services, Department of Health, New Zealand. He discussed the existing (since 1941) fee-for-service scheme, and proposed modifications which should do away with the existing scheme's disadvantages. In New Zealand the government pays a benefit of up to $1.05 for each service by a general practitioner, increased to $1.75 for night, Sunday, or holiday services. Specialist services qualify for the same benefit, but, whereas the general practitioner can claim an extra fee from the fund for prolonged attendance (over 30 minutes), the specialist cannot. The benefit is intended to help the patient to pay the physician's bill. The physician is free to charge what he likes, within reason, the standard charge in general practice, over and above the benefit, being 70 cents for an office visit and $1.05 for a house call. Some doctors still accept the benefit as full payment. The benefit has remained unchanged since 1941.

The fee-for-service scheme works in two ways. Under the refund system the doctor sends out bills in the ordinary way, and patients obtain refunds on the basis of their receipted accounts. This method involves practically no government intervention in ordinary practice. About 25% of doctors, most of them specialists, work on this system. The alternative is the schedule system. The doctor takes only his extra charges (if any) from the patient direct, and claims the benefit by submitting to the Health Department daily schedules listing all patients attended. Most doctors send in their schedules fortnightly or monthly. No patients' signatures are required, but 1% of claims are checked by postal inquiry. The advantages of fee-for-service on these lines over any type of capitation scheme are that there is no contract of service between the private practitioner and any member of the public (the physician is not "bound to his patient by the iron fetters of a legal contract enforceable day and night at the whim of the patient") and that there is free choice on both sides. The result is that complaints about failure to attend patients, or of rudeness or arrogance on either side over calls at inconvenient times, while not unknown in New Zealand, are much rarer than they appear to be in Great Britain, and have no legal significance.

The refund method is excellent but has two defects from the medical point of view. One is that no benefit is payable unless the patient first settles

the doctor's bill, and in consequence all refund practitioners have a proportion of bad debts. Even if the doctor charges no more than the bare amount of the benefit, some patients fail to pay their bills. For this reason there has been a tendency in recent years for doctors to change from refund to schedule. A similar but more serious defect is that it would be a hardship for many patients to have to find the cash to pay their accounts in full, even though they could afterward obtain refunds for all or most of the amounts due. Some practices could hardly be run on a refund system, despite full employment and a high living standard. Both public and doctor would suffer if such a system were universal.

A simple modification of the fee-for-service scheme that would correct most of its faults is the patient schedule system. Doctors would be paid so much by the state for every patient seen in any calendar month, irrespective of the number of times the patient had been seen in that month. In all other respects the scheme would be worked exactly as the fee-for-service schedule system works now. There would be no interference with the refund system, which has no serious defects so long as it is not compulsory. A global sum is agreed on to represent 67% of the agreed aggregate gross income of all general practitioners. For the first few years of the new scheme 8.3% of this pool would represent the sum to be distributed monthly. Doctors would submit a certified return of patients seen, giving date of first attendance in that month only. After about five years it should be possible to arrive at an agreed amount to be paid per patient per month, and the pool system could then be abandoned.

UNITED KINGDOM

Goiters in School Children.—A survey of school children in North Oxfordshire showed a relatively high incidence of thyroid enlargement. The mean incidence of enlargement was 40%, compared with 6% in Oxford city. The normal limit for adolescents is about 3%. A survey made 15 years ago showed that an increase in thyroid enlargement of 27% has occurred since then. The district in question lies on a belt of limestone and marl (clay mixed with calcium carbonate) soil that is deficient in iodine. Water drawn from local wells contained from 0.6 to 3.9 mcg. of iodine per liter. Levels below 3 mcg. are considered to be goitrogenic. Owing to its high calcium content the water is hard, and such water is thought to interfere with the utilization of iodine. Most of the milk and farm produce in this goitrogenic area is grown locally, in iodine-deficient soil, whereas the food eaten in Oxford city is obtained from national markets.

Smoking in Schools.—A survey of the smoking habits of 8,314 children in Oxfordshire schools by a health officer revealed that 193 boys were aged 7 or less when they smoked their first cigarette. Of 4,270 boys interviewed, 2,853 or 67% had tried smoking, and 1,245 or nearly 30% had continued to do so. Of 4,044 girls interrogated, 1,276 or 31.5% had tried smoking, but only 328 or 8% had continued the habit. Family influence played a part in determining whether the children smoked or not. Less than 20% of those who smoked came from families where the parents did not smoke. When both parents smoked the chances that their children would smoke were three times as great as in nonsmoking households. The places where the children smoked were mainly in the home and at the cinema. One of the girls smoked 75 cigarettes a week.

Cutaneous Leishmaniasis.—At a meeting of the Royal Society of Tropical Medicine and Hygiene Prof. P. Garnham and Dr. D. Lewis referred to the rising incidence of cutaneous leishmaniasis in collectors of chicle in British Honduras. These workers enter the forests at the beginning of the rainy season, live a nomadic life moving from one camp to another, and go back to their families when the rainy season is over. Their lesions are found mainly on the ears. The ulcers are chronic and ultimately lead to destruction of the organ involved. An animal reservoir for the causative parasite appears probable, as the chicle gatherers are so sparsely distributed and stop such a short time in one spot that the usual vector, the Phlebotomus, would have little opportunity or time to acquire the infection from one person and pass it on to another. Fourteen species of Phlebotomus were found on local animals. The most satisfactory control measure would probably be an attenuated vaccine.

Emotional State and Energy Expenditure.—It has been generally supposed that euthyroid nervous subjects show a tendency toward a high basal metabolic rate and that diagnostic errors due to emotional upsets may easily be made. This view is challenged by Melville and Mezey (*Lancet* 1:273, 1959), who investigated the strength of the association between the emotional state and oxygen requirements in the lying, sitting, and standing positions in 32 psychiatric patients and 10 healthy subjects. The serum protein-bound iodine levels of all subjects were within the normal range. The psychological state, which varied from almost normal to severe delusional fear, was estimated on a four-point system referring to symptoms indicating emotional disturbance. Two independent ratings were made, one before testing and the other during the test procedure. It was expected that the more disturbed patients would show higher energy expenditures than the controls, but the results did not

confirm this. The mean oxygen consumption of the mentally disturbed patients was not significantly different from that of normal subjects in the lying and sitting positions, and was actually less in the standing position. The most striking finding was the absence of any relationship between emotional state and rate of oxygen consumption.

Sterilizable Blankets.—Woolen blankets are a potent source of cross-infections in hospitals because they attract bacteria and disseminate them in lint. Attempts to sterilize blankets reduce their life to a matter of months. Calnan (*Lancet* 1:300, 1959) solved the problem of the hospital blanket after studying the method used by the Everest expedition for keeping warm. The mountaineers wore string vests under a wind-proof garment. The blanket substitute, which resembles a string vest in structure, consists of a warp-knit mesh fabric of viscose and cotton between two cotton sheets. The three layers are quilted together on a sewing machine. Cotton sheeting is attached to each side of the blanket substitute to allow for a tuck-in. Such blankets have been in use for over a year. After their introduction there was a noticeable reduction in the amount of dust and lint in the wards. The blankets, unlike woolen ones, can be sterilized by boiling or autoclaving without loss of texture.

Health and Social Class.—At a meeting of the British Sociological Association in January Dr. J. N. Morris said that preventable disease is more likely to occur in those of lower social class, because it takes longer for the less educated sections of the population to benefit from the newer knowledge on child rearing, advances in medical science, and medical services offered by the state. On the other hand, social class is not as rigid as it was formerly. There is now greater mobility up and down the social scale, which is largely based on income, status, and residence. It appears that the mentally and physically healthy move up and the unfit move down the social ladder. There has always been, and still is, a substantially higher death rate among the economically underprivileged. There is a closing of the social classes with respect to illness in children. Mortality and morbidity are decreasing more rapidly in children of the lower social classes. A study of the death rate from rheumatic heart disease or the incidence of chronic otitis media shows this.

Dr. Morris drew attention to the preponderance of schizophrenia among the unskilled young men of the lowest social class, which is a result of the mentally unbalanced dropping into a lower income group on account of their illness and lack of earning capacity. Poliomyelitis, on the other hand, is a relatively new disease affecting chiefly those of higher social classes. There is an inverse relationship of paralytic poliomyelitis to the level of sanitation and to infant mortality. Lung cancer and duodenal ulcer, which showed no relation to social class 20 years ago, now show a rising mortality with a fall in the social scale from higher to lower class. Coronary artery disease, which has an increased incidence in higher social classes, appears to be associated with limitation of physical activity. This is understandable, as a rise in social class is associated with a more sedentary job and diminished physical activity. Light workers 45 to 54 years of age show the same rates of ischemic myocardial fibrosis in all the social grades. A rise in the standard of living, with its decrease in physical work, is likely to increase the incidence of coronary artery disease.

Smog.—In the last week of January smog in Britain, particularly in the northwest, was stated to be the worst in living memory. The demand for hospital beds increased sharply owing to the smog aggravating chronic respiratory ailments, especially among the elderly. In Salford the smog appeared as a widespread smoky haze limiting visibility to 200 yd. or less. In this town the smoke averaged 120 mg. per 100 cu. m. and the sulfur dioxide 0.35 ppm. At one period the smoke figure rose to 478 mg. per cubic meter and the sulfur dioxide to 1.64 ppm, about eight times the January average. The demand for hospital beds was so great that hospitals rejected applicants unless their need was urgent. In 1956 the Clean Air Act was passed. Attempts are being made to implement this by creating smokeless zones and by discouraging the use of open coal fires in homes. In the last two years more than 125 local authorities in England and Wales decided to use their powers under the act to enact smoke-control orders. Unfortunately, the "black areas," where smog is most frequent and morbidity from respiratory disease is highest, are among the slowest to comply with the orders.

Influenza.—Influenza has reached a peak in London, whose inhabitants are also suffering from colds, bronchitis, and other respiratory diseases. These are undoubtedly associated with winter fogs and atmospheric pollution. There is a great demand for hospital beds and the services of general practitioners. The London Local Medical Committee, which represents 2,000 doctors in the London area, sent out a request to 3,250,000 patients to defer calling in the physician unless it is absolutely necessary. Patients have also been asked to make their telephone calls early in the day so that the physician can arrange his visits accordingly. In many districts physicians are finding it difficult to cope with the additional sickness. Patients are asked to defer visits for a week or two if their condition does not need immediate treatment. Hospitals have been told to restrict admissions to emergency cases only. The influenza epidemic is mild. Very few

deaths have been reported. Although some of the attacks are attributed to the Asian virus, most of them are probably due to virus B. School children are suffering most. Many schools are only half-filled because of influenza, measles, chickenpox, and bad colds. In one area scholarship examinations of 11-year-old children have been deferred because of absence. In Blackpool there is much absenteeism due to "four day influenza." At Ripley Hospital in Derbyshire no more operations are being performed for the time being because of influenza among the patients and staff.

Militarized Medicine.—Sir George Schuster, chairman of the Oxford Regional Hospital Board, in a survey made for the Acton Society Trust suggested that the Ministry of Health be reorganized and remodeled along army lines (Creative Leadership in a State Service, London, 1959). He considered that the hospitals should be regarded as part of a fighting service and that heads of hospital boards should look to the Ministry of Health for leadership and direction in the same way that army commanders do to their commander-in-chief. Medicine would then have two top posts corresponding to the chief of the imperial general staff and to a combination of the posts of adjutant general and quartermaster general. These positions would be occupied by persons with hospital experience at an operational level. A new type of skilled administrator is needed in the health service, according to Sir George. At present there are not enough top management posts in the hospital service and the pay for those that do exist is inadequate.

Sir George criticizes the present scheme of hospital management. At present this is largely autonomous and in the hands of boards and committees whose members are mainly unpaid volunteers from the hospital staff. They are entrusted with the spending of large sums of money. While he admits the value of such voluntary effort, he believes that economy and efficiency would be improved by intensive, expert study of hospital costs and by the use of work-study programs and other efficiency techniques. While it would be inadvisable to replace this volunteer system entirely by paid officials, it is thought that efficiency would be improved by the introduction of professional administrators, and the formation of central intelligence and statistical departments.

Unlawful Attendance at Wife's Confinement.—A man pleaded guilty to attending his wife's confinement without medical supervision and not in an emergency. This is an offense under the Midwives Act, which requires that only a midwife or doctor may attend a confinement except in emergencies when they are not available. A woman consulted her physician early in her pregnancy and informed him that she would like her husband present when the baby was born. As the physician disapproved she decided to do without him. The pregnancy and puerperium were normal and uneventful. The prosecution was brought by the local county council, which sent a health visitor to see the baby after the husband had sought advice about obtaining a maternity allowance under the National Health Service. The judges gave her husband, who pleaded that he did not know that he was committing an offense, a conditional discharge.

Reduction of Carcinogens in Tobacco.—Dr. E. Wynder (*British Medical Journal*, Feb. 7, 1959) stated that man will continue to smoke, whatever evidence is presented regarding an association between tobacco and cancer. The most practical solution is to render tobacco smoke noncarcinogenic, or at least to reduce its carcinogenicity. This can be done by lowering the tar content of tobacco, reducing the temperature of combustion, and modifying its pyrolysis. It is unlikely that the tar content of tobacco can be reduced by any great extent by effective selection, as the various kinds of tobacco have much the same carcinogenic activity; but an effective filter would help. This practical step should be undertaken by the tobacco industry without delay. A marked reduction in the carcinogenicity of some of the major cigarette brands has already taken place. While such a move will not prevent smokers' developing lung cancer present evidence indicates that it will reduce the chances.

Wynder and his group are currently engaged in a study of the action of a number of substances, including aluminum compounds, to determine whether the temperature of tobacco during smoking can be lowered sufficiently to influence the formation of polynuclear substances. Several suggestions have been made for cooling the main stream of the smoke. The formation of carcinogens is related to the burning temperature rather than to the presence or absence of oxygen. Thus the activity of an 880 C tobacco pyrolysate in nitrogen is similar to that obtained with access of oxygen, but if the temperature is reduced below 700 C the carcinogenicity is reduced. Wynder is investigating the effect of catalysts on the reduction of the polynuclear content of tobacco smoke condensate. These studies are in the preliminary stage and it remains to be determined through combined biological and chemical investigations whether there is a particular catalyst or group of catalysts which could reduce the carcinogenicity of tobacco smoke and still be practical.

Hospital Leadership.—The main conclusion of a survey of hospital organization and administration in the past 10 years, made by the Acton Society Trust, entitled "Creative Leadership in a State Service—a General Survey," is that the Ministry of Health, while handling its administrative tasks

fairly and sensibly, does not yet offer inspiring leadership to the decentralized authorities. Considering how such leadership might be provided Sir George Schuster, chairman of the trustees and himself chairman of a regional hospital board, discussed staffing of the Ministry, liaison between Ministry and regional boards, and provision of a central intelligence organization.

The creation of the National Hospital Service has resulted in the need for a new type of skilled medical administrator. Sir George believes that the Hospital Service could learn from both military organization and industry. The heads of hospital boards, for instance, should be able to expect from the Ministry of Health the leadership and direction which Army commanders would get from their commander-in-chief. From his own experience, Sir George repudiates the suggestion that the voluntary boards and committees, which are a unique feature of the British Hospital Service, are less concerned to insure the wise handling of funds than paid professional administrators would be. He would like to see economies effected not through progressive squeezing by the Ministry, but rather through expert study of the hospital cost structure, the use of efficiency techniques and industrial consultants, and the introduction of work-study methods. The survey is the subject of an editorial in the *British Medical Journal* of Feb. 14.

Children in Hospital.—Children should not be admitted to hospital if it can be avoided, according to an expert committee which made a two-year study of the arrangements for children in hospital. The committee, under Sir Harry Platt, found that at any given time in England and Wales there were nearly 40,000 children in hospital. Medical advance, said the committee, is making it possible to treat more children at home and so avoid the emotional disturbance caused by removing them from familiar environments. Greater attention should be paid to the emotional and mental needs of the child in hospital. The authority and responsibility of parents and the importance of mitigating the effects of the break with home should be more fully recognized. There is much to be said for admitting mothers with their children, especially if the child is under 5 years of age. Parents should be allowed to visit whenever they can and to help with the care of children.

The child should be allowed to take his favorite toys with him. Neither parent nor hospital should prevent his bringing something he loves on the grounds that it is not clean or respectable enough. The committee recognized the difficulty parents have in getting authoritative information about their children's progress. There should be fixed times at which parents could get such information first hand. Children and adolescents should not be treated in adult wards. There should be a plentiful supply of toys and games. All children's wards need a playroom, preferably one visible to those in bed. Hobbies, such as gardening, painting, and handicrafts, should be encouraged. The child, particularly at first, should be handled by as few people as possible. He should be able to get to know his own nurse. The *British Medical Journal* for Feb. 14 commented favorably on the report.

Carcinogens from Bonfires.—The garden bonfire is a major source of the carcinogen benzpyrene, according to Prof. F. C. Pybus of Durham University. Smoke from one of these smoldering heaps examined recently contained 70 parts of benzpyrene per 1 million of free carbon. The concentration of benzpyrene in tobacco smoke is 0.2 ppm. In coal smoke it is 300 ppm. The 180 million tons of coal burnt in a year produced 2,500,000 tons of smoke, against 18,000 tons from the 111,607 tons of tobacco burnt, but the coal yielded 750 tons of benzpyrene, compared with 8 lb. from the tobacco smoked. The author concluded that 90% of cancer is caused by the benzpyrene and other carcinogens in Britain's atmosphere. Great Britain has the smokiest air on earth.

The Insane Criminal.—Treatment with new drugs has transformed some patients who have been dangerously insane for years. Selected patients, many of them murderers, have for several months been given chlorpromazine, perphenazine, or prochlorperazine. Of 180 women patients so treated 30 were formerly so violent that they were locked in their cells permanently except for spells of exercise alone. Today only two are in isolation. The others are well enough to mix with other patients, work, and even attend dances in the concert hall. In one of the cell blocks for the most dangerous male patients is a man who murdered a prostitute 16 years ago. Before drug therapy he was incoherent and made only animal-like noises and was so dangerous that he could not be left alone with anyone except experienced male nurses. Four men had to hold him down for his first series of injections. Within seven days he was asking for the drug in tablet form. In two weeks he was holding normal conversations and working with other patients.

Another murderer had been in isolation for 10 years. In 1956 he was allowed out of his cell as an experiment, and his first response was to kick a nurse in the face. Now, after treatment, he is well behaved. This does not mean that cured patients will be released wholesale. These patients may have to take these drugs for the rest of their lives to remain normal. At this stage they could not be trusted to continue the treatment voluntarily if they were released, but these results are a great relief to the overworked staff. Not only do these people behave rationally but they are ambitious to get well and for the first time they are cooperating in their treatment.

CORRESPONDENCE

THE BASIC MEDICAL SCIENCES AND THE RESIDENCY PROGRAM

At the recent 55th Annual Congress on Medical Education and Licensure the residency program was the subject of a panel discussion, led by Dr. Wright Adams. One of the few points on which there was unanimous agreement was the difficulty in providing instruction at the graduate level in the basic sciences as they apply to the practice of the individual specialties. The important contributions of the basic medical sciences to advances in medicine through research have long been recognized. It is now becoming increasingly apparent that daily practice in the various specialties requires the application of specific physiological and other basic principles. This is recognized by the American specialty boards in their individual brochures, where the inclusion of instruction in the basic sciences as a part of residency training is stressed. The practical difficulty lies in finding available time and personnel to conduct this part of the total training program.

There is no question that the integration of basic and clinical instruction during daily ward rounds and seminars is one of the most effective ways of presenting both types of information. When the resident can relate certain principles of electrolyte balance to the treatment of an individual patient, the principles remain fixed and their application is readily recalled in future similar situations. Yet this alone is now insufficient. In the undergraduate medical curriculum, approximately one-half the total instructional time is devoted to the basic sciences as they relate to all branches of medicine. After completion of an internship, the future specialist usually spends the remainder of his formal training period in a residency program in which attention is focused on the area where he will practice throughout his career. Nowhere in this total program is there an opportunity for the systematic presentation of the important facets of the huge, steadily growing literature in the basic sciences as they apply to his field of specialization. Only in the university hospitals, which include a relatively small proportion of the total approved residencies, is it generally possible to obtain more than occasional visits from an anatomist, biochemist, microbiologist, pharmacologist, or physiologist. In such institutions, the faculty members usually carry such heavy undergraduate teaching schedules and research programs that they have little time left for regular courses for the hospital residents. Further difficulty lies in attempting to find class hours which the residents themselves can attend, uninterruptedly, with reasonable regularity. These problems are compounded in the nonuniversity community hospital, where the pathologist is generally the only basic science specialist on the staff. Even if funds were available to add others, the shortage of trained physiologists and biochemists would limit the use of this solution to the problem.

Recognition of this situation led the Graduate School of Medicine of the University of Pennsylvania to modify its curriculum this year. In the past, the school has offered courses in 14 medical specialties, in which correlated teaching in the basic sciences and their clinical application was conducted throughout the full academic year. This year, each course has been divided into a four-month basic semester and a four-month clinical semester. During the basic semester (September to January), students in all the specialties take the 192-hour correlated basic sciences course, in which is presented a review by body systems of the current literature in the basic sciences. The remainder of the basic semester of each course is devoted chiefly to instruction in the basic sciences as they apply to the individual specialty, and to seminars, conferences, and assigned reading in which the application of the basic sciences to clinical problems is stressed. The basic semesters in the various specialties were designed particularly for incorporation into the residency programs of approved hospitals.

During the current year, the first since the inception of the new program, approximately 50 physicians were sent to the school by their hospitals for the basic semester, in addition to the 200 enrolled for the full academic year. Opinions vary as to whether incorporation of the basic semester is most valuable during the early or latter part of the residency period. In general, we have found that the majority of physicians prefer taking the course after completion of approximately one year of residency. At that time, they have acquired sufficient clinical experience to serve as a background to the instruction offered and they have developed a strong appreciation of the need for further knowledge of the basic sciences in their areas of specialization. On returning to their hospitals after completion of the semester, they should be qualified to add materially to the local teaching programs.

The second, or clinical, semester (January to May) in each specialty is devoted primarily to clinical application and practice. The content of each full academic year's course at the school is thus essentially the same as in former years. This

is of particular advantage to physicians who wish to enter the specialties after several years of general practice, to medical officers of the armed forces, who qualify for assignment to full year's courses, or who have just completed a tour of active duty, and to qualified physicians from abroad who desire a full year's training in the United States. Courses in the dental specialties and in veterinary medical sciences are given only as programs of a full academic year or longer.

Since its founding 40 years ago, the graduate school of medicine has striven constantly to develop more effective means of improving training in the specialties through application of the basic sciences. The present two-semester plan provides a means by which all approved hospitals can participate actively in its program.

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THE NEPHROTIC SYNDROME

To the Editor.—The editorial on the nephrotic syndrome in THE JOURNAL (**169**:846 [Feb. 21] 1959) disturbs us since we are sure it will confuse many readers. It quotes two references by ourselves and our co-workers which deal with the nephrotic syndrome. The other reference is a paper by Hodges (*J. M. Soc. New Jersey* **54**:11 [Jan.] 1957) which deals with the lower nephron syndrome—so-called lower nephron nephrosis or acute tubular necrosis. Since there is no clinical and pathological similarity between these two conditions, and treatment is completely different, the editorial is confusing and misleading. In discussing the nephrotic syndrome, the editorial states that "pathologically the characteristic lesion is necrosis of the tubules." This lesion is seen in lower nephron nephrosis but not in the nephrotic syndrome. There are no characteristic histological lesions in the kidneys of patients with nephrotic syndrome. This condition has many causes and many renal histopathological changes but certainly not tubular necrosis. Other points discussed in the editorial confuse lower nephron syndrome with the nephrotic syndrome. For example, we have never heard of the artificial kidney being used in the treatment of patients with the nephrotic syndrome, but this form of treatment is valuable in the management of patients with acute renal failure due to the lower nephron syndrome.

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LAW DEPARTMENT

MEDICOLEGAL ABSTRACTS

Charitable Hospitals: Immunity from Tort Liability.—This was an action for damages sustained by a patient as a result of the alleged negligence of the defendant hospital. From an adverse judgment, the plaintiff appealed to the Supreme Court of New Jersey.

The plaintiff alleged that he entered the defendant hospital for the purpose of having an operation performed on his eyes. After the surgery he remained at the hospital as a postoperative patient and wore protective bandages over his eyes. During this postoperative period, and through the negligence of the defendant's employees in failing to provide suitable guard-railings on his bed, he was permitted to fall out of bed with great force and with resulting serious injuries. The defendant moved to dismiss the plaintiff's complaint, asserting that since it is a nonprofit eleemosynary corporation it possesses an absolute immunity from any responsibility to the plaintiff for injuries resulting from its alleged negligent conduct. The motion was granted and summary judgment entered in favor of the defendant.

The immunity on which the defendant relies, said the Supreme Court, was first declared in our courts in 1925 as a judicial expression of the state's public policy; however, the reasonable demands and expectations of innocent persons injured through the fault of others has caused many of our judges to suggest pointedly that sound concepts of right, justice, and morality require outright rejection of the immunity. In the case before us, the single issue presented by the parties is whether or not the last vestiges of the judicially declared immunity should at this time be erased.

The common-law duty of due care, with tort liability for its breach, prevails generally through the law although it occasionally comes into conflict with immunities which must find independent support for continued recognition in their own historical and social justification. Professorial and student writings overwhelmingly oppose the immunity of charitable hospitals. Although these writings are free from the restraints of judicial responsibilities, they are worthy of careful consideration for they embody thoughtful and high-minded endeavors to stimulate the movement of our law toward the ever-present goal of obtaining a higher measure of justice for all people.

Professor Scott has extensively discussed three possible grounds which have been suggested for the exemption of charitable institutions from tort liability. The first is that where trust funds are

devoted to charitable objects they should not be diverted from those objects and that payment of tort claims would amount to such diversion, but this legalistic view would deny liability in all tort cases. The second rests on an alleged waiver by the injured party, but such a waiver would be wholly fictitious and a figment of the imagination. The third rests on the inapplicability of the doctrine of *respondeat superior*, but the adoption of this approach would deny liability in all tort cases and would seem to disregard the true ground for vicarious liability in our law. The New Jersey decisions did not really subscribe to any of the foregoing bases but spoke almost exclusively in terms of the public policy as the judges then saw it. Thus one Supreme Court decision recognized that the diversion of the charity's trust funds, if any, was the same whether the tort claimant was a beneficiary or stranger; and another, after finding the plaintiff to be a beneficiary, declared immunity as the state's declaration of public policy.

Times and circumstances have changed, however, the court continued, and we do not believe that some of these early decisions represent current notions of rightness and fairness. Due care is to be expected of all, and when an organization's negligent conduct injures another there should, in all justice and equity, be a basis for recovery without regard to whether the defendant is a private charity. We are satisfied that the views recently expressed in the concurring and dissenting opinions in two New Jersey cases are much closer to the mores and ethical ideals of our times than the earlier cases decided several decades ago. In one of these the court noted that experiences in other jurisdictions had demonstrated that no calamitous social effects would result from dissolution of the charitable immunity; that the availability of insurance had obviated any threat that recoveries against charities would seriously deplete their funds and deprive communities of their benefits; and that individuals "should not be forced to suffer the unmitigated and oftentimes crushing burden of injuries wrongfully inflicted merely to continue a judicially inspired immunity long since outdated by the impact of modern times." The other decision pointed to the harshness and injustice of the immunity rule and questioned any present need for it in view of the widespread availability of insurance. It may be noted that charitable institutions in New Jersey have long been under some tort responsibilities for negligent injuries to others and presumably have protected themselves by adequate insurance coverage; if the enlargement of their tort responsibilities actually results in additional premiums, that should be considered as merely incidental to the rendering of equal justice to all innocent parties who are injured through the negligence of others.

The contention has been advanced that, even though the former public policy notions have been strongly altered, the elimination of the immunity should be left exclusively to the legislature. Judges of an earlier generation declared the immunity simply because they believed it to be a sound instrument of judicial policy which would further the moral, social, and economic welfare of the people of the state. When judges of a later generation firmly reach a contrary conclusion they must be ready to discharge their own judicial responsibilities in conformity with modern concepts and needs. It should be borne in mind, the court pointed out, that we are not dealing with a field of the law in which stability and predictability may be of the utmost concern. We are dealing with the law of torts, in which there can be little, if any, justifiable reliance and where the rule of *stare decisis* is admittedly limited. We find no merit in the defendant's contention that "this court may not constitutionally overturn the immunity doctrine." It seems to us beyond question that, in the absence of any definitive legislative public policy, this court has full power to overrule the earlier declaration of court of error and appeals either because it was originally erroneous or because it has become unsound in the light of modern conditions. Since earliest days our courts have recognized and discharged the vital responsibility of reexamining questioned decisions whether they be their own or those of their predecessors.

The primary function of the law is justice, and when a principle of the law no longer serves justice it should be discarded. In this case the law was embodied not in any controlling statute but in a judicial principle of the law of torts; it had no sound English common-law antecedents and found its way into American law through a misconception; it runs counter to widespread principles which fairly impose liability on those who wrongfully and negligently injure others; it operates harshly and disregards modern concepts of justice and fair dealing; it has been roundly and soundly condemned here and elsewhere; and the time has come for its elimination by the very branch of government which brought it into our system.

Since the dismissal of the plaintiff's complaint was grounded entirely on the defendant's alleged immunity which we now repudiate, concluded the Supreme Court, the judgement in favor of the defendant is reversed and a new trial ordered. *Collopy v. Newark Eye and Ear Infirmary*, 141 A(2) 276 (N. J., 1958).

Malpractice: Res Ipsa Loquitur; Failure to Pretest for Possible Drug Reaction.—This was an action for damages for injuries caused by the alleged negligence of the defendant physician. From a judgment

in favor of the defendant, the plaintiff appealed to the district court of appeals, first district, division 1, California.

The plaintiff was referred by her regular physician to the defendant for a pyelogram, an x-ray study of the urinary tract. It is accomplished by the injection of an opaque iodine dye so that the inside of kidneys, ureters, and bladder can be photographed. The plaintiff testified that the defendant did not make any reaction tests and did not ask her whether she usually had reactions to injections or was sensitive to any particular substance. The defendant insisted that she did ask the necessary questions and that she did make an intradermal sensitivity test. On attempting to make the injection in the right arm, then the left arm, and finally in the veins of one of the wrists and hands, it was found that the plaintiff's veins were friable and had started to bleed. (During these unsuccessful attempts the defendant used about 10 cc. of the dye. Not all of it got into the plaintiff's veins but the defendant observed no adverse reactions to the amount that did.) Defendant therefore told the patient that the injection could be made in either the shoulders or the buttocks and the plaintiff chose the buttocks. After administering Novocain to deaden the pain the defendant proceeded to inject about 30 cc. of Neo-iopax. She admitted that Neo-iopax is an irritant, but she did not warn the patient that there might be a reaction because she did not expect one, never having observed one before. It appeared from the evidence that the manufacturer's comments about Neo-iopax indicated that it was to be used "for intravenous and retrograde urography" but made no mention of intramuscular injections. The defendant stated, however, that it was common practice in the community to inject it intramuscularly if it could not be injected intravenously.

Immediately after injection of the dye, the plaintiff experienced severe pain. An ulcer developed at the site of the injection which subsequently required surgery before it cleared up.

The plaintiff's main contention was that the doctrine of *res ipsa loquitur* applied. It is very doubtful, said the court of appeals, that the doctrine is applicable to the facts of this case. Whether the doctrine is applicable depends upon whether a layman can say, as a matter of common knowledge or observation, or from the evidence could draw a reasonable inference, that the consequences of the injection here involved were not such as ordinarily would have followed if due care had been exercised. In this case the injury arose at the site of the injection. The testimony of the various doctors was all to the effect that it is good and standard practice in this community to give such an injection subcutaneously if it cannot be given in the veins. The defendant testified as to why it was not possible or feasible to give this injection to the plaintiff intravenously. Thus, there is no basis at all for the plaintiff's assertion that there was an inference of negligence because the injection was here given subcutaneously. All the testimony is to the effect that the reaction here involved is one of the risks of such an injection. Such toxic effects are caused by the sensitivity of the individual patient to the dye solution. There would seem to be no basis for the doctrine of *res ipsa loquitur*.

We think, however, continued the court of appeals, that there was substantial evidence, independent of the doctrine of *res ipsa loquitur*, to support a verdict for the plaintiff. The defendant testified that she asked the plaintiff about her reactions to injections and made tests for sensitivity. Although she was skeptical about the value of such tests, the fact remains that the defendant claimed that she made such tests and asked the relevant questions. It is certainly a possible and reasonable inference from the defendant's testimony that the giving of such tests and the asking of such questions were common and standard procedure in this area. But the plaintiff testified that no such tests were given and no such questions asked. Thus, there is a direct conflict in the evidence on the vital issue of negligence. It is a reasonable inference from the evidence, and the jury could have found, that ordinary care required the giving of such tests and the asking of such questions. The jury could then find that it is negligence to fail to give such tests or to fail to ask such questions. Finally, the jury could have found that no such tests were given and no such questions asked by the defendant. Thus, there was a factual issue that should have been submitted to the jury.

The judgment of the trial court in favor of the defendant physician was accordingly reversed. *Horace v. Weyrauch*, 324 P(2) 666 (Calif., 1958).

Malpractice: Careless Remarks by Operating Surgeon.—This was an action for damages for injuries caused by the alleged negligence of the defendant surgeon. From a judgment of nonsuit, the plaintiffs appealed to the district court of appeals, third district, California.

The patient entered the St. Helena Sanitarium and Hospital for the purpose of having a rectosigmoid polyp removed from the lower portion of the large intestine adjacent to and immediately above the rectum by the defendant surgeon. After such an operation it is customary to examine the site of the polyp in order to ascertain whether or not the entire polyp has been removed. There was an attempt to make this examination just before the plaintiff left the hospital, but because of the pain caused to the plaintiff it was decided that the examination

would be made at a later date and with the plaintiff under an anesthetic. Subsequently, therefore, the plaintiff returned to the hospital. She was given a general anesthetic, and a sigmoidoscope was inserted up her rectum without difficulty to the 15-cm. level. At this point the obdurator was removed because the defendant desired to pass the scope under direct vision. In attempting to advance the sigmoidoscope under direct vision slight difficulty was encountered, and on visual examination it was noted through the scope that a loop of the small intestine was visible. A diagnosis of accidental perforation of the sigmoid wall was made, and the plaintiff was immediately taken to the operating room where abdominal repair was performed.

The plaintiff husband testified that when the defendant came out of the operating room he approached him and said, "Boy, I sure made a mess out of things today, didn't I, Warren?" Asked what happened, he replied, "Well, by inserting my scope in your wife's rectum, I busted the intestine."

The defendant testified that a tear of the intestine is not an expected or anticipated thing and that he was totally unaware that the intestine had been torn until "it was noted that loop of the small bowel was visible."

The plaintiffs first contended that a judgment of nonsuit was not proper because of the application of the doctrine of *res ipsa loquitur*. The court held that the doctrine would not apply in the instant case unless it was shown that the accident was one that does not ordinarily occur in the absence of negligence. We cannot say, the court continued, that it is a matter of common experience that a rent in the intestine does not occur during a sigmoidoscopy in the absence of negligence. Expert testimony would be required. The only evidence introduced in this regard was a statement of the defendant that a tear is not anticipated or expected. The mere fact that the result is unexpected or not anticipated is not sufficient to invoke the doctrine of *res ipsa loquitur*.

The plaintiffs also contended that the extrajudicial admission of the defendant was sufficient to establish a prima facie case. The court said that on the issue of nonsuit the plaintiff was entitled to all favorable inferences that could reasonably be drawn from the evidence. What inferences were to be drawn from the defendant's statements, in the light of the facts and circumstances shown by the evidence, was a question of fact to be determined by the jury. We believe that the court erred in determining as a matter of law that no inference of negligence could be drawn from the evidence. We think that the jury could infer from the statement that in inserting the sigmoidoscope he did not use the degree of care ordinarily exercised by other doctors of good standing in the community, and, as a result of the lack of care, the patient's intestine was torn.

Accordingly the judgment of nonsuit in favor of the defendant surgeon was reversed. *Wickoff v. James*, 324 P(2) 661 (Calif. 1958).

Malpractice: Abandonment of Patient.—This was an action for damages resulting from the alleged abandonment of the plaintiff by the defendant physician after having accepted him as a patient. From a judgment in favor of the defendant, the plaintiff appealed to the court of appeals of Georgia.

After a traffic accident the plaintiff was taken to a hospital in Carrolltown, Ga., and from there to the Georgia Baptist Hospital, Atlanta, where the defendant was shown by the hospital charts to be the admitting physician. The plaintiff suffered a fractured left mandible, a fractured zygomatic bone, at least two fractured ribs, fractures of the vertebral column, and a fractured skull. After five days the plaintiff was removed to his home where the defendant saw him weekly for about four weeks, until he advised the plaintiff that he would have nothing further to do with the case. The plaintiff then consulted an attorney to force the defendant to furnish him proper treatment. At the time of the trial the plaintiff still suffered from some of the injuries, and he contended that he had been unable to procure medical treatment since the defendant "abandoned" him.

The plaintiff testified that the defendant told him on March 21 that he would not get well until he obtained surgical treatment but that he, the defendant, would not take care of him. The plaintiff also testified that another physician treated him several times up to March 18, when he said he was going to place him in a hospital.

There was no evidence, said the court, that the defendant abandoned the plaintiff at a critical time when there was a need for immediate treatment, for, although the record does disclose that the plaintiff needed surgical treatment, it does not disclose that such surgical treatment was needed then and there or that if the plaintiff had sought, within a reasonable time thereafter, other medical care he would have suffered any injury from the alleged abandonment. It is undisputed that the day after the alleged abandonment the plaintiff traveled from his home to Atlanta where, at the request of his attorney, he was examined by a physician who recommended that he see a plastic surgeon. It appears that any injury which the plaintiff suffered resulted from his own failure to obtain the treatment recommended for him.

The judgment for the defendant physician was therefore affirmed. *Carroll v. Griffin*, 101 S. E. (2) 764 (Ga., 1958).

MEDICAL FILM REVIEWS

No Man Walks Alone: 16 mm., black and white, sound, showing time 27 minutes. Presented as a public service by the National Paraplegia Foundation Inc., New York. Produced in 1958 by and procurable on rental ($12.50) or purchase ($150.00) from Film Features Inc., 1600 Broadway, New York 19.

This film deals with new developments in the physical rehabilitation of a paraplegic patient. It shows the experiences of a patient from the time he begins treatment for a broken back through his training and adjustment and finally his preparations for work. The teamwork of the hospital staff of physicians and therapists who help the paraplegic patient back to useful living is also shown. It is suitable for showing to lay groups and could also be used for fund raising purposes.

Positioning the Patient for Surgery: 16 mm. color, sound, showing time 27 minutes. Presented by the American Nurses Association and National League for Nursing Film Service in cooperation with the American College of Surgeons. Produced in 1958 by and procurable on loan from American Cyanamid Company, Surgical Products Division, 1 Casper St., Danbury, Conn.

This film demonstrates how the operating room nurse fulfills her responsibility for proper positioning of the patient on the operating table and performs those activities which help to maintain physiological functioning, conserve time and energy, prevent bodily injury, and provide for the comfort and dignity of the patient. The positions shown are dorsal recumbent with one arm abducted, Trendelenburg, lithotomy, lateral, and prone. The safety and physical comfort of the patient are emphasized, and the film shows evidence of good planning. The film might also have demonstrated the importance of talking with the patient and reassuring him, in those cases where he is positioned prior to the induction of anesthesia, but this is a minor criticism. The photography is good, and the film could be shown to nursing students who are having their first experience in the operating rooms. It could also be shown to graduate nurses, either in an orientation program planned for the operating room or in a postgraduate course of study.

Transporting the Patient for Surgery: 16 mm., color, sound, showing time 15 minutes. Presented by the American Nurses Association and the National League for Nursing Film Service in cooperation with the American College of Surgeons. Produced in 1958 by and procurable on loan from American Cyanamid Company, Surgical Products Division, 1 Casper St., Danbury, Conn.

This film demonstrates the coordinated responsibilities, interdepartmental and intradepartmental, of the hospital in providing safe transportation for the patient. Those concerned are the operating room nursing staff, the anesthesiology staff, and the nursing staff assigned to the patient unit. The method of procedure may vary with the facilities available in a hospital; however, the basic principles of safe transportation are applicable. An especially good feature of this film is its emphasis on the nurse identifying the patient and assisting him to the stretcher bed. The actress playing the nurse in the recovery room has an especially pleasant expression and conveys a feeling of genuine interest in the patient. The safety and comfort of the patient are correctly emphasized, and the photography is good. The narration is rather monotonous, but the content of the description is good and the narrator does not appear to be reading. The film is recommended for showing to student and graduate nurses and also to aides and orderlies.

Al in the Hospital: 16 mm., black and white, sound, showing time 22 minutes. Produced in 1950 by and procurable on purchase ($120) from Robert Disraeli Films, 206 E. 17th St., P. O. Box 343, Cooper Station, New York 3.

The story begins in the classroom where Al's chair is empty because he is in the hospital. His classmates write him a letter which the teacher delivers. At the request of his classmates Al makes drawings of his experiences. He tells about the bicycle accident which resulted in a broken leg and explains about x-rays, his cast, and the daily hospital routine. Hospital procedures such as a blood test and an injection are shown. Most of the film is narrated by a boy about 8 years of age and would appeal to children of this age group. Its purpose is to allay the fears of children who might be hospitalized; however, only the pleasant things are shown such as the competent nurse's care and the play room. The film is rather long, but it should be useful for showing to children and their parents.

Stapes Mobilization and Fenestration of the Oval Window for Otosclerotic Deafness: 16 mm., color, sound, showing time 21 minutes. Prepared by Samuel Rosen, M.D., New York. Produced in 1958 by Sturgis Grant Productions, New York, and procurable on loan from Samuel Rosen, M.D., 101 E. 73rd St., New York 21.

The surgical procedures of mobilization and fenestration are adequately explained in this film by drawings and diagrams and beautifully demonstrated by pictures of the actual surgery. The presentation of the anatomy, physiology of the conducting mechanism, and pathology of stapes ankylosis in the film is too brief for teaching purposes, and its value would be enhanced if more time were given to presentation of the problem. Some reference to the history of "mobilization of the stapes" and results obtained by this procedure before the turn of the century would also heighten the teaching value.

The three stages or types of operation used by the author are clearly demonstrated. The advisability of the first and third types of operation, however, is open to question in the light of the experiences of others. The first type has been discarded

by many surgeons because of the danger of fracturing the crura. Also, there have been occasional injuries to the facial nerve in the hands of unskilled operators. The third procedure, fenestration of the foot plate, has been objected to by some surgeons because of failure to obtain useful hearing improvement, rapid loss of any hearing gain obtained, and possible increase in danger of injury to the inner ear. The explanation offered in the film for the gain in hearing from the third procedure is obviously deficient and does not agree with known facts concerning the effect of interruption of the ossicular chain on the hearing of air-conducted sound. Although the conditions which occur here have never been exactly duplicated, it appears that there is some clinical evidence to support the claim that improvement in hearing can be obtained by fenestration of a fixed stapes with the drum membrane intact. Further evidence is needed, however, in order to assess definitely the value of this procedure and either corroborate or disprove the claims made by the author.

The presentation of the problem for which this type of surgery is carried out is inadequate and should be improved, if the film is to be of optimum value in general medical teaching. The photography and recording of the actual surgical procedures are excellent, even though the scientific validity of the interpretations leaves something to be desired. It would have been preferable to indicate clearly that the hearing improvement from fenestration of the foot plate is not yet completely understood.

A Complete Office Gynecological Examination: 16 mm., color, sound, showing time 16 minutes. Prepared by Frederick J. Hofmeister, M.D., Milwaukee. Produced in 1958 by and procurable on loan from Frederick J. Hofmeister, M.D., 2212 W. State St., Milwaukee.

This film demonstrates the author's concept of what constitutes a complete gynecologic examination, and it emphasizes the fact that this must be a complete physical examination and demonstrates the examination of the breasts as an essential phase. Examination of the genitalia includes the Papanicolaou smear, endometrial biopsy, rectovaginal-abdominal examination and, where necessary, a cervical biopsy (which is demonstrated). Breast examination and the various methods of smear and biopsy for both cervix and endometrium are correctly shown. The photography is excellent and the film is recommended for postgraduate teaching of physicians, medical students, and nurses.

A Technique for Measuring Minimal Social Behavior: 16 mm., color, sound, showing time 12 minutes. Produced in 1957 by and procurable on loan from Veterans Administration, Central Office Film Library, Washington 25, D. C.

This is a filmed record of a schizophrenic patient being subjected to a newly devised psychological test. The procedure consists of observing the manner in which he enters the psychologist's office, picks up an ostentatiously dropped pencil, accepts a cigarette or a diagram of a crossed square, answers questions as to his orientations for time and place, and finally responds to a rather abrupt dismissal. The technique of scoring all this is not explained, but we are assured that the results differentiate specific degrees of "minimal social behavior." To an experienced viewer it might seem that the aloof, stereotyped, coldly inquisitorial method employed could well contribute to keeping the subject defensively withdrawn and autistic; perhaps deliberately, no attempt is made to explore his capacity to respond to human warmth or individualized communication. Possibly for the latter reason, some whimsical producer chose a musical background which uses themes derived mainly from Dukas' "The Sorcerer's Apprentice." The film is recommended only to those interested in a comparative study of psychological test procedures rather than in more searching samplings of normal and aberrant conduct.

NEW FILMS ADDED TO A. M. A. MOTION PICTURE LIBRARY

The following films were produced in 1958 as a public service by the Sears Roebuck Foundation in cooperation with the American Hospital Association and the University of Illinois Research and Educational Hospitals. All are in 16 mm., color, and sound. Procurable on loan (service charge $2.00 each) from Motion Picture Library, American Medical Association, 535 N. Dearborn St., Chicago 10.

RX–A Prescription for Better Hospital Procedures
Showing time 25 minutes

The Flow Process Chart as Applied to Hospital Activities
Showing time 20 minutes

The Questioning Attitude as Applied to the Flow Process Chart
Showing time 19 minutes

The Right and Left Hand Chart as Applied to Hospital Activities
Showing time 23 minutes

Motion Economy as Applied to Hospital Activities
Showing time 22 minutes

This series of films is a clear demonstration of the method of planning and inaugurating a work simplification program. It illustrates some of the myriad hospital routines susceptible to such a program and should find application to other related medical centers such as clinics or other types of offices with multiple health programs and procedures. The most impressive thing about this series of related films is that they were made with actual participants in the programs instead of professional actors. An important feature of the series is that it highlights the method of attack and illustrates the results with several lucid examples. Since work simplification is a continuing responsibility of overworked medical personnel, these films should afford a provocative stimulus on a "do it yourself" basis.

(Note: The first film in the series—RX–A Prescription for Better Hospital Procedures—was reviewed in THE JOURNAL of April 26, 1958, p. 2216.)

MEDICAL LITERATURE ABSTRACTS

INTERNAL MEDICINE

The Etiology of Hyperostosis Cranii (Metabolic Craniopathy): A Clinical Study. J. E. Caughey. J. Bone & Joint Surg. **40B**:701-721 (Nov.) 1958 [London].

Hyperostosis cranii or metabolic craniopathy is a syndrome characterized by thickening of the inner table of the skull, which is more usual in the frontal region but may also occur over other parts of the skull, including the basal bones and the orbital plate. There may be generalized thickening of the whole cranium. In the frontal region especially the inner surface of the skull may become nodular, and it may attain a depth of ½ in. (1.27 cm.). This thickening consists of spongy bone containing large numbers of osteoblasts, and the underlying dura is usually thickened and adherent. A review of the literature has revealed that hyperostosis cranii is associated with several clinical states, such as the Stewart-Morel syndrome, acromegaly, and dystrophia myotonica, and it may also occur as "senile hyperostosis." Most workers who have studied the syndrome of hyperostosis cranii have noted the overwhelming occurrence among women. Dystrophia myotonica, a heredofamilial disorder of which hyperostosis cranii is one of the variable and common features, however, occurs equally among men and women. In a small but convincing series of cases of dystrophia myotonica, hyperostosis cranii was also found distributed equally among men and women.

The causation of hyperostosis is still a matter for speculation. More recent studies have focused attention on the endocrine system, and it seems probable, in view of the sex distribution in dystrophia myotonica, that the key to the problem may be found in this disorder. The author studied 50 patients with fully developed dystrophia myotonica, and the cases of 9 of these patients belonging to 6 families are reported in detail. The characteristic skull changes in these patients were hyperostosis cranii, a small pituitary fossa, excessive sinus formation, and prognathism. These changes in the skull may be described as acromegaloid. Gonadal atrophy was a common feature, and endocrine studies suggested that the endocrine defect is primarily a failure of the androgenic function of the adrenals and the testes. In rodents and in man ablation of the gonads leads to overactivity of gonadotrophic cells and, at times, of somatotropic cells. Sometimes pituitary tumors develop. Acromegaloid features may occur in eunuchs, and it is likely that the acromegaloid changes in patients with dystrophia myotonica are of the same order from overactivity of growth hormone. In animals excess of growth hormone produces thickening of the skull. In dystrophia myotonica, acromegaly, and the Stewart-Morel syndrome it is suggested that hyperostosis cranii is an expression of unrestrained activity of growth hormone.

Reduction of Serum Cholesterol in Hypercholesteremic Patients: Effect of a Polysorbate 80-Choline-Inositol Complex. H. L. Fuller. Maryland M. J. **8**:6-13 (Jan.) 1959 [Baltimore].

The difficulty in controlling hypercholesteremia by diet alone indicates that some adjunct to diet would be of value. A number of agents have been studied and proposed for the control of hypercholesteremia. Among these are lecithin, lipotropic agents, estrogenic substances, vitamin B factors, pyridoxine, nicotinic acid, plant sterols, beta-sitosterol, vitamin E and wheat germ oil, polysorbate 80 complex, and unsaturated fatty acids. The author undertook the study of a polysorbate 80 complex in the management of hypercholesteremic patients. Patients were chosen from private clinical practices, general hospital outpatient departments, and chronic geriatric institutions. The subjects were known either to be obese or to have cardiovascular and peripheral vascular disease, diabetes, and hypothyroidism (idiopathic or postoperative myxedema). The serum cholesterol levels were determined. Of the 200 patients screened, 41 were selected who had serum cholesterol levels over 300 mg. per 100 cc. Their cholesterol values ranged from 300 to 1,460 mg. per 100 cc. Seventeen were women, and 24 were men. Their ages ranged from 33 to 66 years. The diabetics included in the study were well controlled, and their diet was deliberately unchanged while they were under observation. The hypothyroid patients maintained an euthyroid state with adequate doses of thyroid hormone. The patients with cardiovascular disease were all in

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fairly good state of health, without evidences of congestive failure or histories of previous thromboembolic phenomena or vascular accidents. Rigid dietary restrictions had failed to induce significant reduction of serum cholesterol levels.

After determining the fasting serum cholesterol levels on 2 separate occasions, a week apart, treatment with polysorbate 80-choline-inositol complex (Monichol) was begun. The mixture was administered in doses of 10 cc. twice daily, and in some patients it became necessary to increase the intake to 40 cc., or even 60 cc. in 24 hours. All patients experienced a significant fall in serum cholesterol; in general, the higher the initial level, the greater the reduction achieved. Normal cholesterol levels could be maintained only by uninterrupted continuance of therapy. A sense of well-being was described by many of the patients. No significant side-effects were encountered. The long-range effect of reducing hypercholesteremia, particularly with respect to the possibility of reducing arterial disease, remains to be established. In a patient with cholelithiasis of the cholesterin variety, the stones were observed to dissolve during the period of treatment with Monichol. The author feels that possibly the medication in conjunction with a rigid low-fat, low-cholesterol diet, administered for the purpose of weight reduction, was the answer, since 2 other women, with shadows in their cholecystograms, who were not placed on restricted diets, did not experience stone resolution. Further studies on this problem are now in progress.

Hemodynamic Effects of Atrial Fibrillation in Patients with Mitral Valvular Disease. B. Caini and M. M. Brunori. Sett. med. **46**:395-401 (Sept. 30) 1958 (In Italian) [Florence, Italy].

Hemodynamics were studied in 80 patients with mitral valvular disease, 30 of whom had atrial fibrillation and the remainder sinus rhythm. Pulmonary arterial pressure was, on the average, lower in patients with atrial fibrillation than it was in those with sinus rhythm; it rose gradually and in proportion to the increasing degree of physical disability in patients with sinus rhythm. There was no significant difference in increased pulmonary arterial pressure among patients with atrial fibrillation and a high rate of physical disability, such as those in groups 3 and 4 according to the American Heart Association classification. The discrepancy in pulmonary arterial pressure among patients with atrial fibrillation of groups 1 to 4 (American Heart Association classification) was also less pronounced than it was among patients with sinus rhythm. Pulmonary capillary pressure was lower in patients with atrial fibrillation than it was in those with sinus rhythm. No patient with atrial fibrillation had a capillary pressure above 25 mm. Hg. Blood pressure within the right atrium in patients with atrial fibrillation was higher than it was in patients with sinus rhythm. The degree of dilatation of the left atrium in patients with atrial fibrillation was distinctly greater than it was in those with sinus rhythm. Thus, atrial fibrillation, which developed in the course of mitral valvular disease, has appreciably changed the hemodynamic state in this series of patients; it relieved the pulmonary hypertension but increased the hypertension in the right atrium and in the venous branch of the systemic circulation.

Thymoma and Hemopoietic Insufficiency. E. R. Fisher and F. D. Beyer Jr. A. M. A. Arch. Int. Med. **103**:95-104 (Jan.) 1959 [Chicago].

The authors point out that the association of thymic neoplasms with myasthenia gravis is well recognized, but that the exact nature of this association is not clear. In recent years attention has been directed to the occurrence of thymic tumors in several other clinical disorders, notably hypoplastic anemia, agammaglobulinemia, and pituitary basophilism (Cushing's disease). This report describes the clinical and pathological features of a 68-year-old man, in whom a thymic neoplasm was associated with severe hypoplasia of the bone marrow and pancytopenia. Sixteen previously recorded cases of the association of a thymic neoplasm or hyperplasia and hemopoietic insufficiency are reviewed. Although absolute proof that the latter is directly caused by the thymic neoplasm is lacking, certain considerations suggest such a relationship.

In at least 2 previously reported instances, the thymic neoplasm clearly antedated the blood dyscrasia. Improvement in hemopoietic function was observed in 5 of the 8 patients in whom a thymoma was successfully resected. The failures after thymectomy do not necessarily refute the significance of this observation. It is conceivable that irreparable marrow changes may occur, preventing a satisfactory response. The delayed response observed in several instances suggests that death may result from intercurrent causes before sufficient time has elapsed for marrow regeneration. It is worthy of consideration that in some instances thymic remnants were overlooked at the time of operation. This possibility suggests that the thymus per se may be influenced by its neoplastic component to produce such an effect. Lastly, rarity of both thymoma and idiopathic hypoplasia of the bone marrow would suggest that their association is more than one of chance. The failure to obtain in the patient presented a history of exposure to chemical poisons or to find clinical or pathological evidence of hypersplenism, endocrine disorder, or hemolytic anemia substantiates the primary nature of the hemopoietic disorder encountered. The rela-

tively small amount of irradiation received by this patient appears insufficient to have produced such an effect.

Pathological classification of thymic neoplasms is unsatisfactory, and the relatively noncommittal term "thymoma" has gained popularity. However, the association of these neoplasms with various disease states suggests that attention should be directed to morphologic variants in thymomas. Review of the previously recorded examples of thymoma associated with refractory anemia or pancytopenia, in which sufficient morphologic information was available, revealed the spindle-cell type of thymoma to be most frequent in this syndrome. The lesion in the patient of this report was also of this type. Attention is directed to the histological similarities of the spindle-cell thymoma and hemangiopericytoma.

Some Less Familiar Roentgen Manifestations of Intrathoracic Histoplasmosis. B. Felson. A. M. A. Arch. Int. Med. **103**:54-62 (Jan.) 1959 [Chicago].

After the demonstration of close correlation between histoplasmin skin sensitivity and intrathoracic calcification in the population of the Ohio and Mississippi river basins, it was predicted that active histoplasmosis would be recognized with increased frequency. This prediction appears to have materialized. For the most part the roentgenologic manifestations of intrathoracic histoplasmosis fall into the following 3 main categories: (1) an acute disseminated form with miliary or small patchy densities diffusely distributed throughout the lungs, sometimes encountered in epidemics, (2) a localized pneumonic form, and (3) the solitary nodule ("coin" lesion, histoplasmoma) of chronic and asymptomatic nature. Each of these types may be associated with hilar and/or mediastinal lymph node enlargement, the so-called primary complex. The healing phase is commonly accompanied by the deposition of calcium in the pulmonary lesions and lymph nodes, though complete clearing of the lungs without calcification is not unusual. The persistent spherical focus, or histoplasmoma, may represent either the end-result of an earlier pneumonic infiltrate or a filled-in cavity and is generally considered inactive. It often contains a solid or laminated central core of calcification, best demonstrated by tomography.

In discussing some less familiar manifestations of histoplasmosis, the author first takes up fibrocavitary histoplasmosis, which was observed in his department at the University of Cincinnati College of Medicine and the Cincinnati General Hospital in 5 patients, who ranged in age from 38 to 76 years. Each had been hospitalized in a tuberculosis sanatorium, where the correct diagnosis was established. A positive histoplasmin skin test was found in 4 cases, and a positive tuberculin test in 3. The histoplasmin skin test is important if Histoplasma capsulatum is not found in the sputum. That the process was essentially fibrotic in nature was evident from the duration of the disease, the irregular, dense, and sometimes linear appearance of the infiltrate, and the contraction of the thorax with retraction of the hilar and mediastinal structures. Extensive cavitation was present in all cases. The cavities were generally large and multiple. In 3 patients the lesions progressed, in 1 they remained stationary, while in 1 marked regression occurred.

Another less familiar roentgenologic manifestation of histoplasmosis is enlarging histoplasmoma. This form is rare, since the vast majority of histoplasmomas remain unchanged over prolonged periods of observation, probably representing a spent form of histoplasmosis. Broncholithiasis, a sequel of long-standing histoplasmic lymphadenitis, is not so rare in the Cincinnati area, at least 12 cases having been observed in the past 5 years. Other sequelae of prolonged histoplasmic lymphadenitis are traction diverticulum of the esophagus, multiple histoplasmomas, the middle-lobe syndrome, and superior vena caval obstruction, the latter resulting from fibrous or calcific mediastinitis. In the endemic area histoplasmosis must be given serious consideration in all instances in which a diagnosis of pulmonary tuberculosis was formerly entertained.

The Varied Clinical Manifestations of Coxsackie Virus Infections: Observations and Comments on an Outbreak in California. R. B. Gordon, E. H. Lennette and R. S. Sandrock. A. M. A. Arch. Int. Med. **103**:63-75 (Jan.) 1959 [Chicago].

The known Coxsackie viruses have been placed in 2 different groups on the basis of histopathological changes produced in the mouse. At the present time, there are at least 19 immunologically different viruses within group A and 5 immunologically different types within group B. The authors discuss epidemiologic and clinical observations incident to a large outbreak of Coxsackie virus infection in California, which was first recognized in and around Shasta County in the summer and fall of 1956. The outbreak was primarily one of pleurodynia, but cases of aseptic meningitis and of pericarditis and pleural effusion were also encountered. As far as the authors are aware, this is the first time that Coxsackie virus, group B, type 5 has been reported as a cause of epidemic pleurodynia. The Coxsackie group B viruses have previously been incriminated as a cause of myocarditis in infants. These viruses are now also incriminated as etiologically responsible for some cases of acute benign pericarditis. The data presented in this report show that infection with a single immunological type of Coxsackie virus, namely, group B, type 5, can give rise to a variety of clinical manifestations, such as

epidemic pleurodynia, aseptic meningitis, pleurodynia with meningeal involvement, pericarditis, and, very probably, myocarditis.

Effect of Prednisone on the Capillary Permeability in Patients with Heart Disease Associated with Edema. F. Fontanini, P. L. Prati and A. Rivi. Sett. med. **46**:401-405 (Sept. 30) 1958 (In Italian) [Florence, Italy].

The authors investigated the existence and the intensity of a possible property of prednisone to control capillary permeability, besides the known diuretic effect, in the course of its administration to patients with heart disease accompanied by decompensation. Fifteen patients with chronic insufficiency of circulation associated with edema received prednisone in daily doses of 0.5 mg. per kilogram of body weight for 5 days. Before the treatment began, an excessive transudation of fluid through the capillary walls was present in 10 patients and an increased loss of protein substances at stasis in 13. Permeability of fluid and of proteins was restored to almost normal values in most patients and was improved in the others. A better effect was observed on the capillary permeability of proteins than of fluid, because the loss of proteins was, on the average, slightly below the upper physiological limit, and the transudation of fluid was, on the average, slightly above that limit. Prednisone therapy in this series of patients corrected the anatomic functional disorder of the capillary permeability, regardless of the action of any hemodynamic mechanism. It is, therefore, an efficacious drug, used either alone or in combination with other cardiotonic drugs, in the treatment of patients with decompensated heart disease associated with edema, who become refractory to common therapeutic measures.

Time of Occurrence and Duration of Pain Periods in Patients with Duodenal Ulcers After Small Meals. H. J. N. Dekkers and J. W. Tjeenk Willink. Nederl. Tijdschr. Geneesk. **102**:2368-2371 (Nov. 29) 1958 (In Dutch) [Amsterdam].

It is generally accepted that the pain of duodenal ulcer is the result of chemical irritation of the ulcer crater by peptic gastric juice or by hydrochloric acid. In earlier studies the authors had demonstrated that this pain occurs during evacuation of the stomach and not, as is widely assumed, when the stomach is empty, and that, therefore, the term "hunger pain" is not justified. They now describe studies they carried out on 139 patients with duodenal ulcers to ascertain the time and the duration of evacuation of the stomach after a small meal. Gastric evacuation was studied clinically in 98 patients and roentgenologically in 84. The test meal consisted of 70 Gm. of bread, 10 Gm. of butter, 30 Gm. of cheese, and 0.4 liter (about ¾ pint) of milk. Fractional titration of the stomach contents ascertained not only the emptying time but also the onset and duration of the pain periods. In 51 of the 84 patients who were subjected to roentgenologic examination, the emptying time of the stomach was measured first after only barium sulfate was given. Later all 84 patients were tested with a mixture of barium sulfate and the same type of food given for the clinical examinations.

The majority of the patients who were examined clinically required more than 5 hours to empty their stomachs; the majority of those studied roentgenologically required more than 6 hours, although barium sulfate alone had left the stomach in 3 hours. Periods of pain, when they did occur, commenced from 1 to 4 hours and ended from 3 to 5 hours after the meal in the clinically examined patients; they generally lasted from 1 to 2 hours. During the somewhat slower evacuation during the roentgenologic tests the duration of pain was more variable than during the clinical tests. In some of the roentgenologic tests the pain terminated more than 6 hours after the meal, but it still coincided with the evacuation. Pain never occurred after evacuation of the stomach was complete.

The Prognostic Value of Leukocyte Studies in Polycythemia Vera Treated with Radiophosphorus. C. F. Stroebel and D. G. Hanlon. Minnesota Med. **42**:10-12 (Jan.) 1959 [St. Paul].

The authors studied the leukocytic activity, based on quantitative and differential leukocyte counts in the peripheral blood, in 212 patients with polycythemia vera who were treated with radiophosphorus (P^{32}) at the Mayo Clinic. The results of these studies allowed classification of polycythemia vera into 4 subdivisions, namely, simple polycythemia vera (in 68 patients), occult leukocytic polycythemia vera (in 69), gross leukocytic polycythemia vera (in 50), and leukemoid polycythemia vera (in 25). In the patients with simple polycythemia vera, the absolute leukocyte count (determined by multiplying the white blood cell count per cubic centimeter by the total blood volume per kilogram of body weight) was 10 or less circulating leukocytes per kilogram. Myeloid immaturity in the peripheral blood did not exceed 1%. In the patients with occult leukocytic polycythemia vera, the absolute leukocyte count exceeded 10 circulating leukocytes per kilogram, but the relative leukocyte count did not exceed 15,000 leukocytes per cubic millimeter. Myeloid immaturity in the peripheral blood did not exceed 1%. In the patients with gross leukocytic polycythemia vera, the relative leukocyte count was 15,000 leukocytes per cubic millimeter or more, but myeloid immaturity

in the peripheral blood did not exceed 1%. In the patients with leukemoid polycythemia vera, myeloid immaturity was noted in the peripheral blood in excess of 1% of the differential leukocyte count. Leukocytosis was or was not present.

This fourfold classification was applied to the study of the remissions occurring in these patients as a result of treatment with P^{32}. The rate of failure of treatment was the same for both groups of patients with simple and occult leukocytic polycythemia vera, but the incidence of long remissions was much higher in the patients with simple polycythemia vera. The over-all picture of resulting status also showed a definite relation to the leukocytic types: the condition of 58 (85%) of the 68 patients with simple polycythemia vera remained relatively simple; that of 43 (62%) of the 69 patients who had initially the occult leukocytic type of the disease became and remained relatively simple, while the conditions of only 22 (42%) of the 50 patients with gross leukocytic polycythemia vera and of 7 (28%) of the 25 patients with the leukemoid type of the disease became and remained relatively simple in type. These findings showed that the fourfold classification of polycythemia vera is of some prognostic importance. When granulocytic hyperplasia is present, the incidence of therapeutic failure is higher, more P^{32} is needed for control, and the greater is the chance for the development of either a leukemoid state or an acute leukemia.

Massive Intraperitoneal Hemorrhage Due to Paracentesis. N. Hakim, W. Hasbrouck and R. K. Spiro. J. M. Soc. New Jersey **56:**19-21 (Jan.) 1959 [Trenton].

The authors present the history of a 65-year-old woman who on admission gave the impression of (1) having rheumatic heart disease with auricular fibrillation, mitral stenosis, and insufficiency, (2) congestive heart failure, and (3) likelihood of digitalis intoxication and pelvic pathology. A diagnostic abdominal tap was made to determine the nature of the ascitic fluid. A no. 18 gauge needle was introduced into the left lower quadrant at a point 5 cm. below the umbilicus in the anterior axillary line. This was the only area free of operative scars and palpable organs. No fluid was obtained on penetration of the peritoneal space. Bleeding at the site of the skin puncture was greater than normally encountered, but it was easily stopped. One hour after this procedure the patient appeared to be apprehensive. Her skin was pale, cold, and clammy. The degree of abdominal distention was unchanged. The only new finding was tenderness at the site of paracentesis. Possible perforation of an aberrant blood vessel or spleen was suspected.

Forty-eight hours after paracentesis the abdomen was very tense, and an exploratory laparotomy was decided upon. Approximately 6 liters of hemoascitic fluid was aspirated from the peritoneal cavity. A large accumulation of blood clots (limited chiefly to the pouch of Douglas and the area of the previous uterine suspension) was also removed. Beneath the site of paracentesis was the area of a firm fibrinous clot, measuring 3 by 6 by 10 cm., which surrounded a dilated omental varix. There was no active bleeding. The postoperative course was uncomplicated. It is believed that the bleeding had stopped 6 to 8 hours after the diagnostic peritoneal tap, as substantiated by the stability of the hematocrit and the level of the hemoglobin after the initial drop. Possible hepatic dysfunction secondary to congestive failure may also have played a role in the hemorrhage. The antihemorrhagic drugs may have helped establish hemostasis. The subsequent symptoms of an acute "surgical abdomen" were probably the result of the intraperitoneal hemorrhage causing peritoneal irritation, increasing abdominal distention, traction on surgical adhesions, and localization of clots in the pelvic floor. It is suggested that the possibility of an intra-abdominal bleeding be considered one of the causes of shock after paracentesis in cases of portal hypertension and ascites.

Toxoplasmosis: Review of Toxoplasmosis in Connection with Report of an Apparently Congenital Case Diagnosed in an Adult. R. K. Westby. Tidsskr. norske lægefor. **78:**1238-1240 (Dec. 15) 1958 (In Norwegian) [Oslo].

Toxoplasmosis occurs in both congenital and acquired form. In congenital toxoplasmosis, hydrocephalus is seen in about 80% of the cases and is due to obstruction of the cerebral aqueduct or the interventricular foramen on both sides. There are intracranial calcifications in about half of the cases. Chorioretinitis, found in 60 to 70% of cases, is usually central and bilateral; in an early stage it is exudative and proliferative, but it later passes into an atrophic stage. Depending on the extent of the pathanatomic changes in the cerebrum, a number of neurological changes occur. Generalized or local convulsions occur in 60 to 70% of the cases. There is almost always mental reduction, varying from the lightest to the severest degrees. Sometimes Toxoplasma organisms are demonstrable in the spinal fluid. Some patients die soon after birth, many have grave defects due to brain and eye injury, others have relatively few symptoms. Acquired toxoplasmosis may present an acute generalized form, acute or subacute meningo-encephalitis, febrile or afebrile lymphadenitis, and monosymptomatic and asymptomatic forms. In a man, aged 60 years, with diagnosis of congenital toxoplasmosis based on the clinical findings, there were hydrocephalus, intracranial calcifications, chorioretinitis, history of generalized convulsions soon after birth, and positive dye test. The dye test was positive in a low titer, which was to be expected so many years after active infection.

SURGERY

Recurrent Mitral Stenosis: An Increasingly Common Occurrence Due to Inadequate Mobilization of the Valve. C. P. Bailey and D. P. Morse. J. Internat. Coll. Surgeons **31**:8-23 (Jan.) 1959 [Chicago].

Of 1,607 patients with mitral stenosis who underwent mitral commissurotomy by the older left-sided approach, there was recurrence of the disease in 44, as was proved either at reoperation or at autopsy. It appeared that the early operations performed on these patients enlarged the mitral orifice enough to give relief of symptoms, but this was not usually enough for objective evidence of relief of the obstruction as evidenced by a change in the size of the heart or disappearance of the diastolic murmur. Gradual reclosure of these scarred valves may take place over a period of years (averaging over 4 years in this series) without a recurrent attack of rheumatic fever.

It is now possible routinely to perform an operation for mitral stenosis that effectively returns the valve to a normal functional capacity. The new operation, for which the term "neostrophingic mobilization of the septal leaflet" has been coined, and which usually can be performed only by the right-sided thoracic approach, entails opening of both commissures to their full curving extent and well into normal flexible valve tissue, so that the new septal leaflet is freely hinged at its base. In addition, it is essential to establish complete bipolar separation of the cross-fused subvalvular chordopapillary structures. The usual size of the valve observed at operation is 1 sq. cm. or less. The average orificial size provided by the older left-sided approach, as determined by catheterization, was less than 2.5 sq. cm. By the new procedure one can obtain a valve area ranging from 4 to 6 sq. cm. in 80% of the patients, thus producing objective as well as subjective evidence of relief of the obstruction. In 50% of the patients the diastolic murmur has been abolished.

Cardiac Ventriculography in the Selection of Patients for Mitral Valve Surgery. J. F. Uricchio, J. S. Lehman, W. M. Lemmon and others. Am. J. Cardiol. **3**:22-27 (Jan.) 1959 [New York].

In selecting patients for mitral commissurotomy, the authors employed cardiac ventriculography-left (a roentgenologic technique consisting of opacification of the left ventricle by direct transthoracic needle puncture) in 42 patients with isolated rheumatic disease of the mitral valve. Of these 42 patients, 28 with significant mitral regurgitation, proved at surgical intervention, had a significant degree of reflux opacification of the left atrium (varying from 2+ to 4+). Of the remaining 14 patients with significant mitral stenosis, proved at surgery, 9 did not have any reflux opacification of the left atrium, while the other 5 patients showed a slight degree of reflux opacification (1+). No deaths occurred among the 42 patients, and there was no appreciable morbidity in this group, although serious complications may occur if the test is not performed with care. The chief indication for cardiac ventriculography-left appears to be present in those patients in whom there is uncertainty as to the presence or absence of major mitral regurgitation and the exact degree of stenosis. Preoperative estimation of such regurgitation is important, because mitral commissurotomy without correction of the regurgitation will not benefit the patient.

Leuko-Erythroblastic Anaemia in Breast Cancer Treated by Hypophysectomy. H. Hortling, K. Malmio, G. A. Björkesten and L. Hiisi-Brummer. Acta med. scandinav. **162**:387-396 (no. 5) 1958 (In English) [Stockholm].

The authors studied 42 patients with metastatic cancer of the breast, on whom hypophysectomy was performed because any other form of treatment hitherto used was refractory. In 8 of the patients leukoerythroblastic anemia was observed before the operation; in 7 of these the effect of the hypophysectomy could be evaluated, and they were followed up from 19 months to 5 years. Diagnosis of leukoerythroblastic anemia was established when the presence of normoblasts or macroblasts or an increased number of granulocytes, i. e., myelocytes or metamyelocytes, could be identified in the peripheral blood. In one patient the only hematological symptom was an increase in rod-like nuclear granuloblasts to an average of 10%. In 7 patients on whom sternal puncture was performed, cancer cells were found. Ordinary routine methods did not reveal any clear signs of hemolysis in any of the patients. The blood picture returned to normal after hypophysectomy in 3 of the 7 patients, whereas an obvious remission of the hematological abnormalities was observed in another 3; in 1 patient improvement of the blood picture resulted, but apparently the disease affected the liver and the patient died.

The effect of hypophysectomy was dramatic in an apparently hopeless situation in one patient whose history is described in detail. A 52-year-old woman experienced pain in the back as a first symptom of cancer of the breast. In September, 1955, a radical operation, with removal of the axillary lymph nodes, was performed. In October metastases were detected in 3 vertebrae; in addition, anemia was observed. Roentgen-ray treatment was given to the vertebrae, and roentgenologic castration of the ovaries was performed. A tendency toward anemia and leukopenia developed. Androgenic therapy was administered for 8 months. The blood values became normal in March, 1956, but in August a rapid aggravation of the general condition

and a deterioration in the blood picture occurred. Cortisone was given for 3 weeks, and hypophysectomy was performed in September. Five weeks after the operation an obvious improvement began, and the patient was practically free of symptoms until April, 1958, when a progressive leukoerythroblastic anemia developed again and death occurred in August. The authors' observations suggest that in cases of mammary cancer metastases in the bone marrow, with resultant leukoerythroblastic anemia, a remission may be attained by hypophysectomy when other types of treatment, including endocrine therapy, have failed.

Contribution to Reoperations on the Bile System (Causes, Indications, Results). B. Kourias, A. Sapkas and C. Athanassakos. Chirurg **30**:1-10 (Jan.) 1959 (In German) [Berlin].

Of 1,432 patients with cholecystitis, who were operated on in the surgical clinic of the Greek Red Cross Hospital in Athens and in other hospitals in Greece between 1945 and 1958, 922 had a cholecystectomy performed, 384 underwent cholecystectomy and drainage of the common bile duct, 36 had an anastomosis between the common bile duct and the duodenum, 65 underwent cholecystostomy, and 25 had miscellaneous operations. Thirty-six (2.51%) of the 1,432 patients had to be subjected to reoperation for serious postoperative conditions from 40 days to 12 years after the first operation. Of these 36 patients, 22 (61%) had had their first operations performed at the Greek Red Cross Hospital in Athens, and 14 (39%) had been operated on in other hospitals in Greece.

The patients were subdivided into 9 groups according to the pathological condition which made reoperation necessary. The first group consisted of 22 patients (63%) in whom stones had remained in the common bile duct; 8 of these had undergone a cholecystectomy as the original operation, and 14 had had a choledochotomy. Considering the total number of 1,432 patients operated on, stones had remained in 1.1% of those who had undergone cholecystectomy and in 3% of those who had undergone choledochotomy. In half of these patients the stones were located in the hepatic or intrahepatic ducts. Omission of careful exploration of the common bile duct for stones, omission of cholangiography or manometry, the presence of a pseudodiverticulum or pouch of the common bile duct, lithiasis of the hepatic and intrahepatic ducts, early interruption of the original operation because of the patient's reduced tolerance, and congenital anomalies of the hepatic and bile ducts were found to be the causes for the postoperative remaining of stones.

Regarding the other groups, the second consisted of 2 patients with functional disturbances of the sphincter of Oddi; the third consisted of 2 patients with a cicatricial stricture of the ampulla of Vater; the fourth consisted of 2 patients with chronic pancreatitis; and the fifth consisted of 3 patients with traumatic or phlegmonous stricture of the hepatic and common bile ducts. Groups 6, 7, and 8 consisted of one patient each, with disturbances caused, respectively, by leaving the stump of the cystic duct too long, aneurysm of the hepatic artery, and a hydatid (echinococcus) cyst in the liver. The 9th and last group consisted of 2 patients who underwent exploratory operations for erroneously suspected stones.

Reoperation consisted of choledochotomy combined with removal of stones and drainage, choledochoduodenostomy, dilatation of the ampulla of Vater, sphincterotomy, removal of newly formed gallbladder, hepaticojejunostomy, transjejunal dilatation of a previously performed hepaticojejunostomy, removal of an echinococcus cyst, and exploratory laparotomy. There were 3 operative deaths (an operative mortality rate of 8.5%), and 2 patients died later. Of the 31 surviving patients, 30 (more than 90%) were in excellent health 6 months to 13 years after reoperation, and 1 was lost to follow-up. All the reoperations were performed with the aid of cholangiography and occasionally with manometric control.

Pancreatico-Gastrostomy in Pancreatico-Duodenal Resection for Carcinoma of the Head of the Pancreas or the Papilla of Vater. E. Millbourn. Acta chir. scandinav. **116**:12-27 (no. 1) 1958 (In English) [Stockholm].

The author performed pancreaticogastrostomy on 7 patients for a malignant tumor of the head of the pancreas or the region of the papilla of Vater. The operations were performed in the department of surgery of the Centrallasarettet in Kalmar, Sweden, in 1947 and 1948. After pancreaticoduodenal resection, the distal end of the stomach was opened through a transverse incision made in its posterior wall, and the stump of the pancreas was brought into the stomach with the aid of long mattress, "stay" sutures. The whole cut surface of the pancreatic end was then secured with interrupted silk sutures into the stomach, through the incision in the posterior wall. The first row of sutures was made from the inside and the second from the outside of the stomach. When possible, omentum was fixed around the pancreaticogastrostomy. A large rubber drain, with side-openings and containing a smaller rubber tube for intermittent suction, was placed in the bottom of the operation area through a stab wound below the right costal margin, proximal and distal to the pancreaticogastrostomy, although not in direct contact with the suture line. In none of the 7 patients did pancreatic, jejunal, or gastric juice or bile ever occur in the fluid drained. The drain permitted

early ambulation. Good healing without leakage or fistula formation in the pancreaticogastrostomy resulted in all the patients.

Pancreaticogastrostomy is somewhat easier to perform than pancreaticojejunostomy. Pancreaticogastrostomy permits repeated studies, even during a long postoperative course, of the excretory function of the pancreas and at the same time of the patency of the stoma. If amylase and trypsin activity is shown in the gastric juice (saliva being always removed by suction during the amylase determinations), the stoma must be patent if no aberrant pancreatic tissue is present in the stomach or in the nearest portion of the jejunum. Trypsin determinations give more reliable information than amylase determinations. In all 7 patients, the surgical intervention created a patent anastomosis for varying periods. In 3 patients, who survived the radical operation for periods varying from 9 months to 2 years and 7 months, the patency of the anastomosis was revealed at autopsy, and in 2 other patients the patency was revealed by trypsin determinations of the gastric juice 2¼ and 3½ years, respectively, after the surgical intervention. The anastomosis thus remained patent for several years even though the pancreatic duct was small at the surgical intervention. Postoperative obliteration occurred about 2 years after radical surgical intervention in one patient. Reoperation with a new pancreaticogastrostomy (side-to-side) was successfully performed 2 years and 9 months after radical resection.

In none of the 7 patients did the flow of the pancreatic juice into the stomach give rise to subjective discomfort. They did not complain of dyspepsia, and the stools were normal so long as the pancreaticogastrostomy was patent. Postoperative examination of the gastric juice showed achlorhydria in the 6 patients who most recently underwent pancreaticogastrostomy. This postoperative achlorhydria probably was the result of pancreatic juice emptying into the stomach, and it is to be considered an important factor in the avoidance of ulcer formation in the gastrojejunal stoma. Pancreaticogastrostomy is recommended in radical pancreatic resection instead of pancreaticojejunostomy, despite the limited number of patients reported on.

Rapid Relaxation of the Right Atrium in the Treatment of Cardiac Arrest Occurring in the Course of Surgical Operation. F. Morino and R. Gentilli. Minerva chir. **13**:1309-1320 (Nov. 30) 1958 (In Italian) [Turin, Italy].

The authors report on 2 patients who suffered cardiac arrest during the course of a surgical operation. The heart was reactivated in both patients by causing a rapid relaxation of the right atrium. In the first patient, an 8-year-old child, arrest of the heart occurred while an attempt was being made to isolate the aorta. No result was obtained by injecting epinephrine and massaging the heart for about 10 minutes. Inasmuch as a marked distention was noticed in the walls of the myocardium, a syringe with a large needle was introduced into the right atrium, and the distention was relieved momentarily by extracting rapidly 50 cc. of blood. Massaging the heart was then started at once, and after a few rhythmic compressions the heart started pulsating spontaneously. After 15 minutes of rest the operation was continued and was completed without further incident. In the second patient arrest of the heart occurred in the course of opening the pericardium. The heart beat was restored after extracting 50 cc. of blood from the right atrium and massaging the heart. The operation was continued after a 20-minute rest and was completed with no further complications.

Sarcoma of the Stomach. B. Thorbjarnarson, J. M. Pearce and J. M. Beal. Am. J. Surg. **97**:36-42 (Jan.) 1959 [New York].

The authors report on 50 patients, between the ages of 16 and 79 years, with sarcoma of the stomach who were treated on the pavillion service of the New York Hospital between 1932 and 1958. Of the 50 patients, 37 had lymphoma, 11 had leiomyosarcoma, 1 had myxosarcoma, and 1 had fibrosarcoma. During the same period, 670 patients with malignant neoplasms of the stomach were observed, so that sarcoma represented 7.4% of all malignant lesions of the stomach. Pain, weight loss, and bleeding were, in order of frequency, the most common symptoms. The clinical and laboratory findings seldom led to the correct diagnosis before surgical intervention. Thirty-two of the 37 patients with malignant lymphoma of the stomach were subjected to definitive surgical removal of the neoplasm. There were 2 deaths after the surgical intervention, representing an operative mortality rate of 5.4%. Thirteen patients survived for 5 years or longer. Since 28 of the 37 patients were admitted to the hospital before 1953 and 24 of these were subjected to definitive surgical removal of the neoplasm, the 13 patients represented 59% of those who were eligible for computation of 5-year survival rates.

Of the 13 patients with other sarcomas than lymphoma of the stomach, 12 were subjected to surgical intervention. There was one postoperative death. Six patients survived for more than 5 years; one died of recurrence 6 years after the operation. Thus, of the entire group of 50 patients, 19 patients survived for 5 years or longer. The prognosis for patients with sarcoma, therefore, is considerably better than for those with carcinoma. Roentgenotherapy is recommended for patients with lymphoma of the stomach but not for patients with other types of sarcoma of the stomach.

Strangulated Femoral Hernia: A Review of 170 Cases. F. A. Rogers. Ann. Surg. **149**:9-20 (Jan.) 1959 [Philadelphia].

A femoral hernia is more likely to undergo acute incarceration and subsequent strangulation than any other common hernia. Strangulation constitutes an urgent surgical emergency. Acute incarceration occurs more frequently in this type of hernia because the small femoral ring, through which the herniation occurs, is more rigid and because herniation through the defect occurs in a more vertical or downward direction. It is this latter factor, uniquely characteristic of the femoral canal hernia, which contributes to the difficulty in reducing it. This study on acutely incarcerated and strangulated femoral hernia was undertaken primarily to discover the results of treatment.

The data from clinical charts of 170 patients treated over a 15-year period on the College of Medical Evangelists surgical service at the Los Angeles County Hospital were tabulated by I.B.M. machine. The group included 116 women and 54 men, 71% of whom were in the age decades of 60 to 90 years. Eight of the 105 patients who knew that they had a hernia had had previous incarcerations. Most of the 12 deaths in this group could have been prevented by elective repair of the hernia. The diagnosis of hernia was made for the first time in 61 of the patients. Vomiting is a prominent symptom. A mass in the femoral region is the most important single physical finding. Acute strangulation of a femoral hernia is a common cause of acute intestinal obstruction among patients more than 50 years of age. When intestinal colic associated with vomiting suggests acute intestinal obstruction, hernial orifices should be carefully examined for the presence of a mass. A femoral hernia and an incarcerated inguinal hernia can be differentiated. The femoral hernia is palpable below and lateral to the pubic spine, while the inguinal hernia is found to lie superiorly and medially to the pubic spine.

In the series reported, when the correct diagnosis was made early, the over-all mortality was low. When the patients had been admitted to hospital services other than general surgery and the proper diagnosis was delayed, the mortality reached 50%. The incidence of gangrene rose sharply as the delay in diagnosis increased. Delay in surgery for any reason greatly increased the number of deaths. Many patients reached the hospital in shock. Others had suffered fluid and electrolyte loss and required replacement therapy before operation could be carried out. An adequate surgical approach is important, and the excellence of the Cheatle-Henry extraperitoneal, retropubic operation is emphasized. The over-all mortality rate for this series was 13%. The male operative mortality was 20%, while that of female patients was only 10%. Thirty-five patients required resections of gangrenous portions of the small intestine; there were 9 deaths in this group. Postoperative complications occurred in 37 patients, and there was a 6.6% wound infection rate. An elective repair of all femoral hernias is advisable.

The Value of Intra-Articular Injections in Osteoarthritis of the Knee. J. H. Miller, J. White and T. H. Norton. J. Bone & Joint Surg. **40B**:636-643 (Nov.) 1958 [London].

The authors report on 59 men and 122 women with osteoarthritis of the knee treated by intra-articular injections. The 181 patients were accepted for treatment, provided that pain was present when treatment was begun and was not showing any tendency to subside, that positive roentgenologic evidence of osteoarthritis was present, and that treatment had not been given previously. Three solutions, chosen as typical of those in common use, were employed for injections, namely, lactic acid solution, procaine (Novocain) hydrochloride solution, and hydrocortisone solution. Isotonic sodium chloride solution and mock injection (given with a special syringe, with which neither air nor fluid could be injected into the joint, although the same visual effect was produced by this device as by fluid) were used for control purposes. Each patient was allotted 1 of the 5 types of injection at random, and the same type of injection was used throughout his or her treatment, which consisted of 5 injections at intervals of 2 weeks. Each patient was reviewed on 2 occasions, 6 weeks and 6 months after the end of the treatment.

Irrespective of the type of injection used, including the controls, no significant difference in the effects was demonstrated in the results. From the point of view of the assessing physician, there was found an appreciable objective improvement, which was fairly evenly distributed. Presumably, this indicates a more natural and confident use of the joint, and is a reflection of the change in outlook of the patient after the injections. The objective assessment also showed that the percentage of improvement was higher among men than among women. Between the men and the assessor agreement was almost complete, but more women expressed satisfaction than the assessor was prepared to accept on clinical grounds. The inference is that women are more susceptible to suggestion in this form of treatment, and here again the psychological element must be taken into account.

Most patients in each group expressed satisfaction with their treatment. This does not depend at all on the injection of any particular substance into the joint, but rather on the psychological atmosphere created. The use of joint puncture can, therefore, be accepted as a reasonable placebo in the care of osteoarthritis. It follows that, if puncture is

decided upon, the least noxious and most economical substance (isotonic sodium chloride solution) or none at all (mock injection) should be used.

The Environmental Distribution of Staphylococcus Aureus in an Operating Suite. R. I. Wise, F. J. Sweeney, G. J. Haupt and M. A. Waddell. Ann. Surg. **149**:30-42 (Jan.) 1959 [Philadelphia].

At the Jefferson Medical College Hospital in Philadelphia an attempt was made to determine the presence and extent of contamination by staphylococci in the operating rooms and to detect the source and mode of entry of the pathogenic bacteria into clean surgical wounds. All the material for bacteriological investigation was collected during 71 operative procedures. A total of 1,096 cultures were obtained in 5 days. This number included 206 nasal cultures, which were obtained by moistening swabs with nutrient broth and introducing a swab into the anterior nares of every person entering the operating rooms. It was found that members of the hospital staff who had close contact with infected patients had a greater incidence of coagulase-positive cultures of staphylococci isolated from the anterior nares. Many different bacteriophage types of Staphylococcus organisms were detected in the anterior nares of the 136 persons who entered the operating rooms during the 5 days from Aug. 13 to Aug. 17, 1956. Five of these types were known to cause postoperative wound infections during the period from July 1 to Oct. 31, 1956, and were isolated from 13% of the personnel. Other strains were isolated which were not implicated in any infection during the period.

Staphylococci were isolated from the interior of 90% of 481 surgical gloves at the conclusion of the surgical procedures. The mean bacterial count was 4,212 per glove. Coagulase-positive staphylococci were isolated from 14% of the gloves, but none of the strains from gloves was susceptible to bacteriophage. Approximately 10% of the surgical gloves were punctured or torn during surgery. Coagulase-positive staphylococci were isolated from 11% of samples of skin obtained from the edge of incisions, from 8% of samples of solution used in rinsing instruments during surgery, and from 17% of surgical incisions which were cultured just prior to closure. These strains, with 2 exceptions, were not typeable with bacteriophage. Various fomites, such as talcum powder, rubber drains, tubes, soaps, brushes, and surgical packs, were found to have a low incidence of viable bacteria. The air of the operating rooms contained chiefly staphylococci but mixed with other bacteria. The contamination of the air became greater as the number of persons in the room increased. None of the cultures of coagulase-positive staphylococci obtained from the air was typeable with bacteriophage.

Infections of deep surgical wounds developed in 2 of the 71 patients in this series. In both instances coagulase-positive staphylococci were isolated from the infectious processes, but the cultures were not typeable with bacteriophage, and so it was not possible to trace the source of these infections. The authors stress the need for rigid aseptic techniques to prevent hospital personnel from becoming carriers of pathogenic bacteria and from spreading these bacteria to susceptible hosts. The prophylactic use of antibiotics cannot be substituted for aseptic techniques, since the strains causing the infections are usually resistant to the action of the commonly used antibiotics.

The Management of Pathological Fracture of the Major Long Bones from Metastatic Cancer. R. A. Bremner and A. M. Jelliffe. J. Bone & Joint Surg. **40B**:652-659 (Nov.) 1958 [London].

The authors report on 40 patients (29 women and 11 men) with disseminated cancer. Thirty-three of these patients had 36 pathological fractures of the long bones (double fractures having been sustained by 3 patients), for which they were treated by internal fixation and irradiation, and 7 patients received the same treatment for "prophylactic" reasons, since they had destructive lesions of the long bones from metastatic cancer. Nineteen of the 40 patients had cancer of the breast; 8 had bronchial carcinoma; 13 had carcinoma of the thyroid, carcinoma of the rectum, epithelioma of the scalp, malignant angioendothelioma of the nasopharynx, carcinoma of the kidney, carcinoma of the esophagus, and multiple myelomatosis, respectively; and in 3 the site of the primary tumor was undiscovered. Of the 43 lesions, the neck and trochanteric region of the femur was involved in 19, the upper third of the shaft of the femur in 10, the middle third of the shaft of the femur in 8, and the humerus in 6.

All the patients were treated by internal fixation at the earliest opportunity, either by an intramedullary nail or in the case of some lesions near the subtrochanteric region, where an adequate grip could be obtained for plate screws below the lesion, by a nail and plate. All were also given irradiation therapy, and, when intramedullary fixation had been employed, the whole length of the involved bone was irradiated. Excluding the patients treated "prophylactically," 25 (83%) of the 30 patients who had sustained a fracture of the lower extremity survived for more than 6 weeks, and all returned to walking with crutches; union occurred in 80% of these fractures. Four of the 5 patients who had sustained a fracture of the humerus survived to regain a functionally useful arm, and 3 of the fractures united. "Prophylactic" internal fixation and irradiation therapy appeared to be helpful in 5 of the 7 patients.

The danger of disseminating tumor cells, either generally or locally, is the main criticism of this method of treatment. In those patients in whom irradiation therapy was used to cover the whole of the operation area, there was no evidence of spread into the soft tissues locally or along the medullary canal. Internal fixation might not be justified in the treatment of a single metastasis from a primary tumor of low-grade malignancy carrying a prognosis of several years, but, in general, the theoretical dangers of dissemination may be ignored. The difficulties of the technique are easily surmountable and have probably been overemphasized in the past. Internal-fixation and irradiation therapy is the best method at present available for dealing with the difficult problem of management of a pathological fracture of a major long bone through a metastatic cancer deposit.

Some Comments on the Treatment of Fractures of Long Bones in Children (With Special Reference to 3,594 Cases). J. Desbrosses, J. Rebouillat, C. Bosser and M. Guilleminet. Presse méd. **66:**1929-1930 (Dec. 6) 1958 (In French) [Paris].

Conclusions are drawn from a large collection of statistics gathered from 3,594 cases on the infants' surgery service of Debrousse Hospital and at the orthopedic and infant surgery clinic of Edouard Herriot Hospital in Lyons. The authors have sought to show the respective parts that manual reduction and surgical methods play in fractures of the long bones in children from 1 to 15 years old. They particularly noted the predominant incidence of location of fractures in the upper extremity, fractures being located in this extremity in 2,742 out of 3,594 cases (or 70.2%). The upper extremity was chiefly affected at the level of the forearm (1,364 cases) and at the elbow (797 cases). In the latter case, surgical reduction was often required, not essentially for reasons of the immediate subsequent vasculonervous complications but on account of the functional future, which might be heavily compromised by a defective bone alignment, an antibrachial abutment, or a stiffened joint. All juxta-articular or articular fractures in the child should be carefully reduced to avoid severe hazards. Out of 126 cases of external condyle fracture, 32 were surgically reduced, or 25%, which is one of the highest operative percentages. Conservative management should be tried, but this occasionally proves inadequate, especially for the elbow, which in this study required operation in 18.3% of the cases.

According to the authors' findings, fractures are much less frequent in the lower extremity and are much less operable. The femoral diaphysis is the bone which is most often operated on. In this series, 11% of the fractures of this type were operated on (40 interventions out of 364 fractures), but this was an unusually large number owing to the particular circumstances. All fractures of the ends of the tibia were treated orthopedically, and only 24 fractures of the tibial diaphysis, out of 443 such fractures, had to be osteosynthesized. This study shows the authors' tendency first toward utilizing manual reduction of fractures and then toward having recourse to surgery in carefully chosen cases when it alone can have satisfying results. There was surgical reduction in 22.2% of the fractures of the upper extremity and in 7.7% of the fractures of the lower extremity in this series. The over-all percentage of fractures which were operated on was only 9.4% (340 out of 3,594 fractures).

Diverticula of the Duodenum (Contribution of Cases and Clinical Considerations). A. Jovine and G. Francini. Acta chir. ital. **14:**743-771 (Sept.-Oct.) 1958 (In Italian) [Padua, Italy].

Nine patients with duodenal diverticula, observed at the surgical clinic of the University of Padua in the last 12 years, are reported on. Comparison of the data available from these patients and those available in the literature shows that duodenal diverticula are frequent but that most of the time they are asymptomatic. Only in a small number of cases have duodenal diverticula caused such disturbances as to make surgical intervention necessary. Roentgenologic examination was found very useful by the authors in studying the diverticular formations and the various other organs in which concomitant lesions could be present. Medical therapy is indicated unless surgical intervention is made necessary by major complications. Whether resection or invagination of the diverticulum must be performed is to be decided by taking into consideration the state of each patient. Palliative interventions, such as gastroenteroanastomosis, are indicated when resection or invagination may be too dangerous.

NEUROLOGY & PSYCHIATRY

Dystonia Musculorum Deformans Alleviated by Chemopallidectomy and Chemopallidothalamectomy. I. S. Cooper. A. M. A. Arch. Neurol. & Psychiat. **81:**5-19 (Jan.) 1959 [Chicago].

The author reports on 16 children with advanced dystonia musculorum deformans, which has previously been demonstrated to be a progressive incapacitating disease of childhood, characterized by involuntary movements and deformities of the entire body. This disease has heretofore been considered to be unresponsive to medical, surgical, physical, or psychiatric therapy. The author subjected the patients to chemopallidectomy and/or chemopallidothalamectomy; in these operations well-localized but sufficient-sized lesions were ac-

curately placed in the globus pallidus and/or ventrolateral nucleus of the thalamus. In 3 patients the operation was performed bilaterally. Thirteen of the 16 patients obtained marked alleviation of the involuntary movements and deformities of this previously intractable, progressive disease. The cases of 5 of the 13 patients, 2 boys, aged 16 and 18 years, and 3 girls, aged 12, 10, and 13 years, respectively, are reported on in detail, illustrating this alleviation. Such relief has now persisted for more than 2 years in several of these patients. The entity of dystonia musculorum deformans can no longer be considered as a hopeless, irreversible disease. Chemopallidectomy and/or chemopallidothalamectomy is the treatment of choice in alleviating it.

Therapeutic Possibilities During the Acute Stage of Heine-Medin's Disease (Poliomyelitis). H. Zischinsky. München. med. Wchnschr. **101**:30-33 (Jan. 2) 1959 (In German) [Munich, Germany].

The author shows that an effective specific therapy is not available for acute anterior poliomyelitis. Treatment with serum of convalescents, with gamma globulin, or with antibiotics all proved ineffective. In view of the pathogenesis of poliomyelitis, an effective specific treatment is even theoretically impossible. Laboratory studies on a patient, whose history is presented, indicate that viremia and invasion of the virus into the central nervous system take place at a time when there is as yet no suspicion of poliomyelitis. For this reason therapy will always come too late, even if a specific therapy were available. Much can be done during the acute stage of poliomyelitis. Good nursing care is important. Paralysis of deglutition and respiration demands special measures. These are most effectively supplied in special poliomyelitis centers staffed with suitably trained teams and equipped with all instruments and devices for therapy and rehabilitation.

The Use of Ritalin in Psychotherapy of Depressions of the Aged. A. Jacobson. Psychiat. Quart. **32**:474-483 (July) 1958 [Utica, N. Y.].

The author investigated the effectiveness of methylphenidate (Ritalin) hydrochloride, a new central nervous system stimulant and antidepressant, in facilitating psychotherapy in depressed patients of the involutional age group. Patients, including both those with reactive and those with involutional depressions, undergoing psychotherapy and simultaneously receiving Ritalin, were evaluated regarding changes in alertness, sense of well-being, dissipation of morning fatigue, cooperativeness in psychotherapy, and ability to function socially and otherwise. A placebo was substituted for Ritalin in a second comparable group of patients. Each group included 27 patients; all were in the 6th and 7th decades of life. Patients recognized as manic-depressive were excluded. Ritalin was given in doses ranging from 10 to 30 mg. 3 times in the first 8 hours of the day, at spaced intervals. All the patients were ambulatory and were considered fair-to-good subjects for extramural care, inasmuch as suicide was not believed an imminent threat.

The author's chief aim was effective psychotherapy, which is difficult in depressed patients because, by the very nature of their illness, they have difficulty in sharing their thoughts and feelings with others. It was his impression that Ritalin had a place in opening this communication barrier to effective psychotherapy. The drug facilitated communication and cooperation chiefly by its mood-elevating effects. The psychomotor stimulation was without significant effect on the blood pressure; furthermore, there was no depressive let-down as the effects of the drug wore off. Twenty-two of the 27 patients receiving Ritalin showed slight to marked improvement. Five patients showed no improvement and required hospitalization and/or electric convulsive therapy. Of the group of 27 patients who did receive a placebo instead of Ritalin, 11 showed minimal to moderate improvement; 16 required hospitalization and/or electric convulsive therapy. Four illustrative case histories are presented.

Ritalin appeared to increase the effectiveness of psychotherapy with elderly depressed patients. As in an earlier paper, the author was impressed by the increase in alertness, and the dissipation of early morning depression and fatigue and by the lack of evidence of addiction. The usefulness of Ritalin in counteracting the lethargy or oversedation of ataractic drugs was also mentioned.

Human Infection with Listeria Monocytogenes: Review of Main Features of Listeriosis. O. Jessen. Ugesk læger **120**:1701-1707 (Dec. 18) 1958 (In Danish) [Copenhagen].

Human infection with Listeria monocytogenes is regarded as rare in Denmark, but the number of cases reported is thought not to reflect the true frequency. Both human and animal listeriosis is spread over the entire globe. The reaction of the organism to the bacteria is typical: there is either supuration, with a considerable number of mononuclear cells in the pus, or formation of miliary granulomas (listeriomas), with a central coagulation necrosis and peripheral accumulation of reticuloendothelial cells, leukocytes, and monocytes. The symptoms occur in different combinations, with transition forms. The 2 most important syndromes are presumably meningoencephalitis and the septic granulomatous form in infants. Clinically, meningitis due to L. monocytogenes is not distinguishable from other forms of bacterial meningitis. It may be

preceded by a short prodromal stage. The further course is marked by meningeal and cerebral symptoms. The course is often violent; it may be subacute. In some cases the disease passes into a subchronic stage, with persistence of bacteria in the spinal fluid for months, and is clinically marked by neuropsychiatric symptoms and moderate fever. The peripheral picture is marked by neutrophil granulocytosis. Disseminated granulomatosis in infants (granulomatosis infantiseptica) is transmitted from mother to child in utero, perhaps now and then to the child during birth. In most cases of pregnancy listeriosis, a retrospective diagnosis is not possible. With signs of grave disease in the newborn infant, listeriosis should be considered. During the course of a localized infection, hematogenic spread may cause metastatic foci in practically every organ.

Early and adequate antibiotic and chemotherapeutic treatment has decisively improved the prognosis in listeriosis. The treatment must be continued for at least 10 days after disappearance of clinical symptoms. Excellent results have been attained with the tetracyclines. Treatment with penicillin, together with sulfonamides, has been effective in some cases, but seems less reliable. In the American literature erthromycin is recommended, especially combined with penicillin.

Dissecting Aneurysms of the Carotid Artery Following Arteriography. J. F. R. Fleming and A. M. Park. Neurology **9**:1-6 (Jan.) 1959 [Minneapolis].

The authors report on a 58-year-old man and on a 32-year-old woman in whom a dissecting aneurysm of the common carotid artery occurred in the wall of the artery as a complication of percutaneous carotid arteriography at the site of needle puncture, with narrowing or occlusion of the arterial lumen. Carotid arteriography had been performed for a subarachnoid hemorrhage from a berry aneurysm on the right internal carotid artery in the man, and for a massive intratemporal lesion causing hemiplegia on the left in the woman. Both patients died, and autopsy was performed on both. In the man, the common carotid artery was narrowed sufficiently to provide massive cerebral hemorrhage. In the woman, the hemorrhage was small and was an incidental finding at autopsy. It is surprising how resistant the vessel wall is to the trauma of puncture. However, large autopsy surveys indicate that in a significant percentage of patients subjected to arteriography a small dissecting aneurysm may occur similar to that observed in the woman. Lesions large enough to occlude the lumen, similar to that which occurred in the man, are very rare, but a few have been reported. Nevertheless, even the smallest intimal elevation may become the site of thrombus formation and thus a possible source of emboli. The clinician should be alert to this complication which may explain certain postangiographic symptoms and may elucidate the interpretation of incomplete filling of the carotid artery in some cases. To prevent a dissecting aneurysm, which may be produced at either the puncture site or the site of perforation of the intima of the posterior wall of the artery, a short, beveled, perfectly sharp needle, as small in diameter as feasible, should be used.

PEDIATRICS

Neurological Involvement in Kaposi's Varicelliform Eruption: Clinical and Electroencephalographic Observations and Considerations. E. Cheli and G. B. Cavazzuti. Minerva med. **49**:3961-3968 (Oct. 24) 1958 (In Italian) [Turin, Italy].

Neurological involvement was studied in 8 children, 5 to 12 months old, with Kaposi's varicelliform eruption. The eruption had been contracted by each child in the 3rd or 4th month of life. Fever lasted in each case from 6 to 10 days. Neurological involvement was evidenced by clinical symptoms in 3 children, by changes in the cerebrospinal fluid in 3 (by glycorrhachia in 2 and glycorrhachia, cytorrhachia, and albuminorrhachia in 1), and by electroencephalographic changes in 2. Three of 4 children who showed neurological involvement on electroencephalographic studies showed no clinical symptoms of neurological involvement, and the spinal fluid was found to be normal. Electroencephalographic findings became normal in one week in 2 of these 3 children; some isolated delta waves, at average voltage, were still present after 12 days in the 3rd child. The authors believe that the neurological involvement in patients with Kaposi's varicelliform eruption is a specific expression of a generic ectodermotropism of the herpetic and vaccine virus causing various pathological manifestations, and that its minimal neurological manifestation can be detected only by means of electroencephalographic studies.

Virus Embryopathies. T. Hellbrügge. München. med. Wchnschr. **101**:15-20 (Jan. 2) 1959 (In German) [Munich, Germany].

A review of the clinical, experimental, and embryologic knowledge on the virus embryopathies suggests that transplacental transmission of virus is possible at any time during pregnancy. The resulting damage to the fetus depends upon the stage of pregnancy during which the infection took place. During embryogenesis damage occurs to organs and organ systems that are in the developmental phase, and malformations result. These have their sites of predeliction, such as in the epithelial cells of the crystalline lens, in the sensory cells of the inner ear, in the ameloblasts of the dental primor-

dia, and also in the heart and brain, that is, in cell systems characterized by an intensive nucleoprotein metabolism, which apparently provide favorable conditions for the growth of the virus. Damage produced by a virus has a definite phase specificity, for, regardless of the time of virus infection, it begins only during the stage of differentiation, which is connected with an increased cellular metabolism. This explains the involvement of one or several organs.

When infection is caused by viruses that act slowly, such as the rubella virus, the destructive processes continue for a long time, even after birth, whereas in the case of viruses that act with a sudden explosive effect the destructive processes are clearly evident a few days after infection. Virus invasions do not necessarily cause infections. For instance, if infection with rubella virus occurs during the first month of pregnancy, 25% of the infants show embryopathy. With virus infections in succeeding months of pregnancy, the prognosis for the fetus becomes more favorable, and, if they occur during the last months of pregnancy, the pathological changes in the fetus are similar to those that result from postnatal infection. The incubation periods of the most important virus diseases are listed, and it is suggested that women in the early stage of pregnancy should be isolated from children who either have virus diseases or are likely to be in the incubation period. Pregnant women are likely to forget virus infections that occurred very early during pregnancy, but will sometimes recall them, when the date of the last menstruation is fixed or the days of pregnancy are counted on which the intrauterine injury to eye or ear may have occurred.

Osseous Injuries in the Newborn. W. C. Mitchell and M. B. Coventry. Minnesota Med. **42**:1-4 (Jan.) 1959 [St. Paul].

The authors report on osseous injuries in newborn infants observed at the Mayo Clinic. Trauma to the skeleton of the newborn infant is of interest to the family physician, obstetrician, and orthopedist. Primiparous mothers with difficult breech deliveries constitute the largest group with which injuries to the bones and epiphyses of newborn infants are associated. Torsion, traction, and digital pressure are the usual mechanisms of injury. The fracture may be induced deliberately to facilitate delivery of the infant. The newborn infant has such unique propensity for the formation of callus and healing of bones that nonunion is almost unknown. Shortening and angulation of even 40 to 50 degrees usually are corrected by subsequent growth. Consequently, masterful neglect may be legitimate therapy in certain osseous injuries occurring in newborn infants. Fractures of the shaft of the femur require active treatment, and Bryant's traction gives excellent results if used properly. The trauma of a difficult delivery may cause epiphysial or subperiosteal hemorrhage presenting clinical symptoms; however, roentgenologic evidence of injury may not be present until proliferative calcification occurs in the hematoma, which may take 5 to 7 days. Such injuries apparently all heal without residual deformity.

Acute Obstruction of Small Intestine Secondary to Hematoma in Children. A. L. Mestel, G. A. Trusler, S. A. Thomson and C. A. F. Moes. A. M. A. Arch. Surg. **78**:25-32 (Jan.) 1959 [Chicago].

The authors report on a 9-year-old girl and an 8-year-old boy with acute obstruction of the small intestine secondary to hematoma. Both had a history of abdominal injury, and both had abdominal pain and vomiting. Laparotomy was performed on the girl and revealed a hematoma of the second, third, and fourth parts of the duodenum which was resected. The child recovered after an uneventful postoperative course. The boy had a history of an undiagnosed bleeding disorder, manifested by several prolonged bouts of bleeding due to trauma and minor surgery. On admission, the patient denied any recent trauma, but the next day it was ascertained that he had been struck in the epigastrium by the butt of a rifle while at play. A tube was passed into his stomach and attached to suction. Dextrose, sodium chloride solution, and blood were given intravenously. A gastrointestinal series of roentgenograms disclosed a large filling defect within the distal duodenal cap and second portion of the duodenum. The stomach appeared to be elevated with indentation on the greater curvature; there was an almost complete obstruction present at the duodenojejunal juncture. The patient's condition remained unchanged for 3 days when he began to have tarry stools. Fresh whole blood (1,650 cc.) and fresh frozen plasma (800 cc.) were given over the next 3 days. Coincidental with the passage of tarry stools, the boy was able to take fluids by mouth, and the duodenal tube was removed. Within several days he was on a normal diet. It was postulated that the duodenal hematoma must have evacuated into the intestine.

Of 19 cases of acute obstruction of the small intestine secondary to hematoma in children which were collected from the literature, 13, in 10 boys and 3 girls, between the ages of 7 days and 15 years, have been reviewed. Eleven of these 13 children had a history of abdominal injury, as the authors' patients did. The most constant clinical features are abdominal pain, vomiting, and leukocytosis. Roentgenologic examination confirms the diagnosis. The condition can be treated without surgical intervention by gastric suction and intravenous administration of fluids. If surgery is per-

formed because of erroneous diagnosis or election, evacuation of the hematoma without resection is the preferred treatment.

Exophthalmic Goiter in Children. A. B. Hayles, R. L. J. Kennedy, O. H. Beahrs and L. B. Woolner. J. Clin Endocrinol. 19:138-151 (Jan.) 1959 [Springfield, Ill.].

There has been considerable controversy as to whether children with exophthalmic goiter are best treated with antithyroid drugs or by subtotal thyroidectomy. During the period from 1908 through 1955 at the Mayo Clinic, 253 children, all less than 15 years of age, had thyroid disease diagnosed as exophthalmic goiter. It was hoped that observations over this 48-year period would add to the understanding of the course of exophthalmic goiter in children, and would help to appraise subtotal thyroidectomy as a method of treating it. There were 217 girls and 36 boys, a ratio of about 6:1. The disease in children does not appear to differ significantly from that in adults, although there is less tendency for children to have severe exophthalmos. Exophthalmos that occurs during childhood may persist for years after thyrotoxicosis has been relieved. Diabetes mellitus is observed more frequently among children with exophthalmic goiter than would be expected as a chance occurrence. Exophthalmic goiter during childhood, if adequately treated, does not alter adolescent development.

Subtotal thyroidectomy is a satisfactory and safe method of treating exophthalmic goiter in children. There were only 4 hospital deaths among 196 children treated in this way. No surgical death has occurred since 1933 among children treated by subtotal thyroidectomy. More extensive resection of the thyroid gland has not eliminated the recurrence of hyperthyroidism. Myxedema, although not considered a serious complication, occurs in a high percentage of patients treated by the extensive subtotal resection of the thyroid gland that is now carried out at the Mayo Clinic. Hypoparathyroidism, keloid formation in the operative scar, and injury to the recurrent laryngeal nerves rarely occurred in the patients of this series. The authors believe that a final evaluation of the best method of treating exophthalmic goiter in children must await an extensive experience with other methods of treatment.

Spontaneous Gangrene in Early Infancy. J. R. Vasquez, A. A. R. Mendilaharzu and J. E. Mosquera. Arch. argent. pediat. 29:152-163 (Sept.) 1958 (In Spanish) [Buenos Aires].

Five infants with spontaneous gangrene were observed in the Hospital de Niños in Buenos Aires between 1950 and 1956. The first, a newborn infant, was hospitalized in a critical condition with gangrene from obstetric trauma and septicemia. He did not respond to penicillin, streptomycin, and vasodilating drugs and died 10 hours after hospitalization. An autopsy showed deep and superficial thrombophlebitis of all veins in the region involved by gangrene. The other 4 patients were between the ages of 3 months and 1 year and, on hospitalization, were in a state of severe dehydration from septicemia, vomiting, and diarrhea. The treatment of these 4 patients consisted of intravenous injections of plasma, cortisone, penicillin, and streptomycin and subcutaneous injections of solutions to control dehydration. One infant with gangrene of the fingers of both hands and another with gluteal and facial gangrene responded well to the treatment; the areas of gangrene became limited, and the scars from necrotic tissue were eliminated, the patients being discharged one month after hospitalization.

The remaining 2 patients (the 4th and 5th of the series) were hospitalized in a very critical condition. The 4th patient had gangrene of the fingers of one hand, meningeal symptoms, and pneumonia. Besides the treatment given to all the patients, she was given intravenous injections of an acetylcholine preparation (Arterocolina), but death occurred 24 hours after hospitalization. No autopsy was granted. The 5th patient had symmetric gangrene of the hands and feet. Radial and tibial posterior pulses were absent. In addition to the treatment given to the other patients, this patient had anesthetization of the splanchnic nerves, and Novocain was used to anesthetize the stellate ganglion, but the child died 10 hours after hospitalization. An autopsy failed to show thrombosis or sclerosis of arteries and veins, but the cubital and radial arteries showed a fibrinoid degeneration. The author states that this case of symmetric spontaneous gangrene of the hands and feet of an infant is the first to be reported in the literature. It suggests an unknown predisposing factor, probably fibrinoid necrosis, which in association with other common causal factors determines this special type of gangrene in infants.

"Maple Syrup Urine Disease": An Inborn Error of the Metabolism of Valine, Leucine, and Isoleucine Associated with Gross Mental Deficiency. D. Y. Mackenzie and L. I. Woolf. Brit. M. J. 1:90-91 (Jan. 10) 1959 [London].

A girl, aged 4 months, with severe mental deficiency was admitted to the Hospital for Sick Children in Oxford. Her condition at birth appeared normal. When one week old she stopped sucking and had to be tube-fed. At 4 months she was noticed to be jerking her limbs and occasionally to become breathless and cyanosed. There was no control of head movements, although she occasionally attempted to follow a bright light with her eyes. A firm liver edge was palpable 1 to 2 finger-

breadths below the costal margin. Lumbar puncture produced a normal cerebrospinal fluid under normal pressure, but the electrocardiogram showed an abnormal record. The urine was examined to exclude phenylketonuria. On smelling a fresh specimen, the similarity to maple sirup was detected. On paper chromatography of the urine, valine, leucine, and isoleucine were found in large amounts. These amino acids were also present in the blood, cerebrospinal fluid, and saliva in great excess. Keto acids were present in the urine in large amounts, as were nonketo acids with the properties of alpha-hydroxy acids. The "maple sirup" smell is due mostly to the alpha-hydroxy acids, though modified by the keto acids. Paper chromatography of the urine for indole derivatives revealed an excessive excretion of indoleacetic and indolelactic acid. The blood true sugar concentration was only 60 mg. per 100 cc. after eating and 52 mg. per 100 cc. on fasting.

The authors suggest that this child has an inborn error of metabolism, and point out that Menkes, Hurst, and Craig in 1954 reported 4 cases, in one family, of severe progressive cerebral dysfunction, associated with the presence in the urine of an organic acid smelling like maple sirup. Also, Westall, Dancis, and Miller in 1957 reported one patient with "maple sirup urine disease," who had raised blood and urine concentrations of valine, leucine, and isoleucine and who in many respects resembled the patient reported here. "Maple sirup urine disease" is not a satisfactory name for the condition. Although one could use, for example, "leucic aciduria," there is no logical reason for picking one rather than another substance in the urine to provide a name for the disease. Since the inborn error of metabolism of the 3 amino acids may be associated with a block at the oxidative decarboxylation stage, "carboxylase deficiency disease" might eventually meet the need for a better term. Tryptophan metabolism is also interfered with, as in the case in patients with phenylketonuria. Differentiation of this condition from phenylketonuria needs special care.

OPHTHALMOLOGY

Presentation of an Unusual Case of Progressive Exophthalmos. R. W. Patterson Jr. and J. E. Campbell Jr. J. Tennessee M. A. **52**:13-14 (Jan.) 1959 [Nashville].

The authors report on a 29-year-old woman who had been treated by an otolaryngologist for sore throat of several days' duration. Severe headache occurred, and pain and tearing of the left eye were followed by definite 3-to-4-mm. proptosis of the left eye, with marked edema and tenderness about the left orbit, for which the patient was hospitalized with a diagnosis of retrobulbar abscess. During the initial period of hospitalization large doses of antibiotics were administered, but the course of the exophthalmos rapidly increased in severity. The proptosis and chemosis became extreme. No evidence of thyroid dysfunction could be found. In an effort to halt the progression of the exophthalmos, corticotropin (ACTH) was given in association with desiccated thyroid. The emotional stability of the patient became uncontrollable, and prednisone in doses of 40 mg. daily was substituted for corticotropin. Within several days the proptosis and chemosis began to show definite improvement. On discharge the patient was receiving a daily dose of 30 mg. of prednisone, and this was gradually reduced to 8 mg. daily. The proptosis disappeared completely 9 months after the initial attack and 2 months after complete withdrawal of the drug. The causation of the exophthalmos in this patient was unknown, but the condition responded dramatically to treatment with prednisone. Cases of progressive exophthalmos may occur in the absence of any demonstrable thyroid abnormality.

Cortical Blindness with Partial Recovery Following Acute Cerebral Anoxia from Cardiac Arrest. W. F. Hoyt. A. M. A. Arch. Ophth. **60**:1061-1069 (Dec.) 1958 [Chicago].

The author reports on a 39-year-old woman with cortical blindness resulting from cardiac arrest leading to profound cerebral hypoxia. The patient had suffered multiple stab wounds in the right side of the chest, inflicted with an ice pick by a man with whom she had been living. On admission to hospital, pneumothorax was suspected and confirmed by a chest roentgenogram. During the performance of the x-ray examination the patient suddenly had acute respiratory distress and became unconscious. Within 2 minutes an emergency thoracotomy was performed, and manual massage of the heart was begun. Within 3 to 5 minutes normal heart beat and blood pressure were restored. The pneumothorax was controlled with catheters placed in both chest cavities. To combat the effects of acute cerebral hypoxia, the patient was placed in hypothermia within 2 hours after thoracotomy, and her body temperature was lowered to 88 F (31 C). She remained in deep coma; her pupils were dilated and fixed and did not respond to light. Hypothermia was maintained for 3 days and coma continued for 36 to 49 hours. Hypothermia was discontinued when the patient's pupils responded briskly to light. Within 12 hours she was able to talk readily, and her comprehension was good.

Nine days after the stabbing, the patient was moved to a general hospital ward through crowded corridors and onto elevators. It was reported that she was unable to see the people whose voices she heard around her. At this time neurological examination revealed that her reflexes and general body sensations were intact and that she had no cere-

bellar signs. However, she was unable to recognize a small hand light in any part of the visual field of either eye, and she could not perceive hand motions, although her pupillary reactions and optic fundi were entirely normal. At this time classical cortical blindness was recognized.

The case of this patient illustrates true cortical blindness as differentiated from blindness arising from more extensive lesions, such as are frequently described under the eponym "bilateral homonymous hemianopsia." The author believes that there are 2 main reasons why the patient had cortical blindness and failed to show signs indicating more extensive cortical damage. These factors are hypothermia and transtentorial shift. Hypoxia influences particularly laminas 3 and 4 of the cortex, and the visual cortex is particularly susceptible (also the motor cortex, basal ganglions, and cerebellum). Profound involvement of the visual cortex, without evidence of involvement of other cortical areas in this patient, suggests that hypothermia may have avoided some of the cerebral damage which characterizes such cases. However, particular vulnerability of the posterior pole of the brain to acute anoxia and, in addition, some degree of transtentorial herniation occurring as a result of swelling (with resultant embarrassment of the blood supply to the visual cortex) may well explain cortical blindness in this patient.

INDUSTRIAL MEDICINE

Clinical Evaluation of Methocarbamol (Robaxin) in an Industrial Facility. C. S. Plumb. Journal-Lancet **78**:531-532 (Dec.) 1958 [Minneapolis].

Skeletal muscle spasm is a complaint frequently encountered in industrial medical practice. The industrial physician must attempt to provide sufficient relief, so that the worker can return to his job, but he also must be sure that the worker can perform his duties in a safe manner, for nothing would be gained if side-effects were induced that might render the worker vulnerable to accident or injury. Mephenesin and then zoxazolamine were popular for some time as muscle relaxants, but had shortcomings. This paper is concerned chiefly with methocarbamol (Robaxin), the latest addition in the field of muscle relaxants which has a more extended activity than mephenesin.

Observations are reported on 60 industrial workers who were treated with methocarbamol. These patients encompassed a good cross section of 2,500 workers of a chemical and paper manufacturing industry. Care was taken to include in this study only workers who, on their initial examination, were considered to have uncomplicated skeletal muscle spasm. The minimal dose of methocarbamol necessary for a satisfactory response was found to be 1 Gm. (2 tablets) every 4 hours; smaller doses did not produce the desired results. Fifty-five of the 60 workers could return to full or light duty. The author concludes that methocarbamol reduces muscle spasm without producing side-effects, and that it is a safe drug, which the industrial physician may use with confidence.

Mortality Due to Coronary Disease Analyzed by Broad Occupational Groups. J. M. Mortensen, T. T. Stevenson and L. H. Whitney. A. M. A. Arch. Indust. Health **19**:1-4 (Jan.) 1959 [Chicago].

The question whether executive and managerial personal are more likely to die of a coronary heart disease than laborers was the motive for this study based on the mortality rate among male employees of the U. S. Bell Telephone Company. This investigation was carried out over a 5-year period beginning in 1951 and extending through 1955. Deaths were classified according to the International List of Causes of Deaths. A comparison of the death rates of coronary causes and of all causes showed a sharp rise in the proportion of coronary deaths in persons ranging in age from 26 to 40 years. At the age of 40 years the ratio of deaths due to coronary disease and the total deaths was almost the same, staying within the range of 30 to 40% through the age of 60 years. A slight decline appeared at the later age. Active employees, ranging in age from 40 to 64 years, were used for comparison among the different occupation groups. This age group made up more than 375,000 life years of exposure in the 5-year period, and among these workers 1,082 deaths due to coronary causes occurred. In order to make a comparison among the occupations, the employees were classified into groups according to their type of work and the responsibility involved.

The ratio of actual to expected deaths in the group of white-collar workers was 106%, with a probable deviation of $\pm$ 3; there is a 50% chance that the true ratio for this group would be between 103 and 109%. A similar range for the group of laborers was from 93 to 99%. Even though the death rate of coronary causes appeared to be higher in the group of white-collar workers, there was no consistency within the groups. The subdivisions of the group of managers, which included officials, supervisors of staff, and foremen, could be classified as pertaining to top, middle, and lower management. The top executives not only showed the lowest level of mortality of the group of managers, but also of the entire group of employees. The high mortality rate of the clerical group was to some extent caused by a transfer of physically impaired craftsmen into this group.

Summarizing the results of this study, it is evident that among male employees of the Bell System there is no substantial difference between the mortality rate due to coronary disease of the top execu-

tives and that of craftsmen and laborers, but there is a marked difference between the mortality rate of top executives and that of middle managerial personnel. This fact cannot be explained by these data. The popular notion that top executive positions are associated with a high death rate caused by coronary disease may be attributed to the great publicity connected with these deaths rather than to statistical facts.

THERAPEUTICS

Mechanism of Action of Pyretotherapy in Neurosyphilis: Possibilities of Use in Leprosy. M. B. Moreira. Rev. brasil. med. **15:**624-628 (Sept.) 1958 (in Portuguese) [Rio de Janeiro].

General paresis and tabes dorsalis are controlled by pyretotherapy by a dual mechanism of effects of intermittent marked changes of temperature on Treponema pallidum and a reaction of the reticuloendothelial system with an increased production of phagocytes. In neurosyphilis, pyretotherapy kills T. pallidum or makes it more vulnerable to the effects of antisyphilitic drugs and more amenable to phagocytosis, which is carried out by the large mononuclear cells, the lymphocytes, and the microglia. Neurosyphilis and leprosy are nonfebrile diseases whose causal organisms are susceptible to induced pyretotherapy. Pyretotherapy in leprosy renders Mycobacterium leprae more vulnerable to the effects of the sulfones and more amenable to phagocytosis. A large number of patients with leprosy in the San Roque Colony in Rio de Janeiro have been treated with sulfone compounds after pyretotherapy. This article is a preliminary note, aimed at inciting interest in the possibilities of pyretotherapy in leprosy. The results up to now have been very promising.

The Protein-Sparing Effect of Androgenic Hormones After Gastrectomy. R. G. A. van Wayjen, J. Groen and A. F. Willebrands. Nederl. tijdschr. geneesk. **102:**2413-2422 (Dec. 6) 1958 (In Dutch) [Amsterdam].

The utilization of proteins was investigated by means of balance studies in 31 patients who had been subjected to gastrectomy. The amount of food eaten was carefully weighed, and, in order to determine the utilization of proteins by the body, the nitrogen content of the urine and feces and the fat content of the feces were ascertained. The balance studies required from 10 to 45 days. A total of 41 balance studies were carried out, some patients being subjected to more than one. Thirteen of the patients were treated with androgenic hormones, and 18 were not. The utilization of proteins improved in all except one of the male patients treated with androgenic hormones in the form of testosterone propionate. A lower dose of testosterone propionate combined with estrogens improved the nitrogen balance in a female patient.

Comparison of the calorie intakes and of the body weights of the patients while they were in the hospital revealed that those receiving hormone treatment consumed an average of 2,355 calories a day and gained an average of 3.9 kg. (8½ lb.) in weight over a period of 30 days; the respective figures for the 18 patients not receiving hormone therapy were 2,740 calories and 1.4 kg. (3 lb.). Thus, the treatment with androgenic hormones was accompanied by a greater weight increase. Furthermore, the increase in weight continued when, after discharge from the hospital, the patients were given maintenance doses of testosterone phenyl propionate. The androgenic hormone therapy caused no unpleasant side-effects. The authors feel that androgenic hormone therapy can be recommended for patients whose nutritional status is impaired as the result of total or partial gastric resection.

Chlorothiazide (Chlotride) as Part in Treatment of High Blood Pressure. H. S. Mathisen and D. Jensen. Tidsskr. norske lægefor. **78:**1230-1231 (Dec. 15) 1958 (In Norwegian) [Oslo].

Sixty patients (27 men and 33 women) with hypertension were treated with chlorothiazide for an average of 6.2 months. The agent was administered by mouth in 0.5 Gm. tablets, and seldom more than one tablet was given daily. Often the dose was reduced to one-half tablet daily, given after breakfast and with 1 or 2 days' interlude during the week on long-term treatment. Except in one case, chlorothiazide was combined with one or several other hypotensive medicaments with which the patient had been treated for some time. In the combined hypotensive treatment, the dosage of the other hypotensive substances was unchanged, except in the case of ganglion-blocking agents whose doses were usually cut in half. Chlorothiazide taken by mouth in doses of 0.25 to 0.5 Gm. not only has a diuretic effect but also reduces the blood pressure in hypertensive patients. In these doses chlorothiazide increases the effect of other hypotensive agents (hydralazine, rauwolfia, protoveratrine, and ganglion-blocking agents). Patients who have undergone sympathectomy are sensitive to chlorothiazide treatment. The agent is well borne, with minimal side-effects, and is regarded as valuable in the medicinal treatment of high blood pressure.

Antibacterial Effect of Ristocetin. A. Farulla, A. Cassano, L. Nuzzolo and G. Giordano. Riforma med. **72:**1353-1355 (Nov. 29) 1958 (In Italian) [Naples].

A study in vitro on the antibacterial effect of ristocetin is reported on. The antibiotic used in the study contained component A and component B of ristocetin in a proportion of 70 and 30% respectively. The minimum concentration of ristocetin neces-

sary to inhibit the growth of Micrococcus (Staphylococcus) pyogenes var. aureus was 4.5 mcg. per milliliter; in some cases, though, it was 9.4 mcg. per milliliter. The minimum inhibitory concentration values obtained in tests with hemolytic streptococci and streptococci of the viridans group ranged from 0.3 to 1.2 mcg. per milliliter. Marked sensitivity was noticed in tests with Streptococcus faecalis and Diplococcus pneumoniae. Ristocetin had no antibacterial effect on gram-negative bacteria, but all gram-positive bacteria from recently isolated strains were sensitive to the drug. Fifty strains of M. aureus, 10 of hemolytic streptococci, 10 of Str. faecalis, and 10 of D. pneumoniae showed 100% sensitivity to ristocetin, and no natural resistance was noticed. All the strains of hemolytic streptococci, Str. faecalis, and D. pneumoniae were 100% sensitive to such other antibiotics as penicillin and tetracycline, while M. aureus showed a 42% sensitivity to penicillin and a 96% sensitivity to tetracycline.

PATHOLOGY

Pleural Biopsy in the Diagnosis of Pleural Effusion: A Report of 200 Cases. P. Mestitz, M. J. Purves and A. C. Pollard. Lancet **2**:1349-1353 (Dec. 27) 1958 [London].

The authors performed 228 punch biopsies of the parietal pleura, using the Harefield needle, on 200 patients, between the ages of 3 and 85 years, most of whom had an effusion at the time of the investigation. One hundred seventy-four patients had one biopsy, 24 patients had two, and 2 patients had three. Biopsy established the diagnosis by determining the cause of the effusion in 80% of the patients with tuberculous effusions and in 60% of those with malignant effusions. Pleural punch biopsy proved to be by far the most reliable diagnostic technique in patients in whom tuberculosis was suspected. Only one of the diagnoses made with the aid of the 228 biopsies proved to be wrong. Pleural punch biopsy may be the only way of making a definite diagnosis during life. Trivial complications consisted of subcutaneous hematoma in one patient and a small pneumothorax in another patient. Pleural punch biopsy is a simple and safe method which should be part of the initial investigation of every patient with a pleural effusion of uncertain causation.

Ossifying Bronchial Adenoma. C. P. Thomas and A. D. Morgan. Thorax **13**:286-293 (Dec.) 1958 [London].

It is generally conceded that bronchial adenoma is a benign epithelial tumor of mucous glands, with a cylindromatous variant of low-grade malignancy, but the "mixed tumor" theory still has adherents. The occasional presence of bone in the growth is usually attributed to metaplasia of the stroma. The frequency with which ossification occurs in bronchial adenomas is difficult to assess. Between 1939 and 1958, 63 cases of bronchial adenoma were treated by resection by one of the authors. Widespread ossification of the type dealt with by the authors was mentioned by the pathologist in only 3 cases, which are described in this paper. The authors conclude that bone formation in tumors is due to a metaplasia of the stroma brought about by multiple factors. Its relative frequency in bronchial adenomas is due in part to slow growth, but principally to the presence of cartilage in or near the tumor. The cartilage undergoes necrosis and calcification and affords a convenient medium for ossification. Where distant metastases of malignant epithelial tumors are ossified, the metaplasia is probably due to a chemical influence exerted by the tumor cells themselves.

The Effect of Hypercalcemia Induced by Calciferol upon Renal Concentrating Ability. F. H. Epstein, M. J. Rivera and F. A. Carone. J. Clin. Invest. **37**:1702-1709 (Dec.) 1958 [New York].

Polyuria and loss of renal concentrating ability have frequently been observed in patients with hypercalcemia. It has not been clear whether the capacity of the kidneys to concentrate urine is selectively impaired by hypercalcemia or whether it is depressed, together with many other renal functions, as a result of injury to and encroachment upon active renal parenchyma. In the experiments described, the effects of hypercalcemia on renal function and morphology were studied in rats given large doses of calciferol (vitamin D_2) for several days. Hypercalcemia was induced in rats by 4 daily injections of 200,000 to 400,000 units of calciferol. Renal concentrating ability was markedly impaired, although there was little or no change in blood urea, urea clearance, or the excretion of phenolsulfonphthalein. Morphologic changes in the kidneys were sparse and consisted chiefly of lesions involving the collecting ducts in the outer medulla. It is suggested that similar alterations in renal structure and function may be responsible for the polyuria and hyposthenuria observed in a variety of clinical states associated with hypercalcemia or nephrocalcinosis.

RADIOLOGY

The Advantages and Limitations of Cobalt 60 Hectocurie Teletherapy. N. Simon and S. M. Silverstone. Am. J. Roentgenol. **81**:38-42 (Jan.) 1959 [Springfield, Ill.].

The authors feel that occasional bursts of enthusiasm by the lay press distort and exaggerate the benefits derived from radio cobalt (Co^{60}) teletherapy, but the radiotherapist realizes that the true value lies somewhere between the exaggeration of the lay press and the iconoclasm of the over-

conservative radiologist. The beneficial features of Co^{60} teletherapy include: (1) skin sparing; (2) increased depth dose; (3) lessened bone absorption; (4) decreased side-scatter; and (5) simplicity of operation. Skin sparing of the Co^{60} beam is by far its most advantageous characteristic. It allows high dosage through single portals, and sometimes this skin sparing provides access with radiation to lesions which are not usually considered treatable. For example, carcinoma of the rectum, either the postoperative recurrence or the locally unresectable lesion in the hollow of the sacrum, is difficult to treat unless the skin over the sacrum can be spared.

Although increased survival may be too much to expect, palliation and control of bleeding are more often achieved with Co^{60} teletherapy than with irradiation in the "conventional" range. The lessened bone absorption with Co^{60} teletherapy increases the dose to tissues beneath bone, such as brain and pelvic organs, and it is also possible that radionecrosis of bone may be lessened. The decreased side-scatter of the Co^{60} beam is presumed to account for lessened radiation sickness. The experience of these authors in the treatment of 600 patients with a Co^{60} hectocurie unit in the past 3 years bears out this presumption. Finally, a Co^{60} hectocurie apparatus is far simpler to operate than a 200-kv. or supervoltage roentgen-ray machine.

The authors discuss the following disadvantages of Co^{60} hectocurie therapy in comparison with 200-kv. roentgenotherapy: (1) unsuitability for intraoral (and intravaginal) therapy; (2) unsuitability for treatment of skin cancer; (3) reduced usefulness of the large fields; (4) too much penumbra at long-source skin distances; and (5) requirement of radiation protection of operating personnel. The use of electron filters to help in the design of cones, particularly for treatments at short-source skin distances with the hectocurie units, is discussed. There are two advantages to the use of short-source skin distances: (1) increased output and (2) rapid dose fall-off. These advantages can be obtained, while still retaining the skin-sparing feature of Co^{60} teletherapy, by closing the end of the cone with a thin sheet of brass.

An important lesion deserving special comment in relation to Co^{60} hectocurie teletherapy is carcinoma of the larynx. Early results in 30 patients indicate as favorable a response as the best obtained with 200-kv. roentgenotherapy. In addition, the patient has no skin discomfort, and after a few months the epilation is the only identifying characteristic of the skin treated. If laryngectomy is indicated for persistence or recurrence of the lesion after Co^{60} treatment, healing of the operative wound will not be seriously hampered. The relatively low morbidity, the retention of voice, and the comparatively satisfactory "cure" rate render Co^{60} hectocurie teletherapy the treatment of choice in lesions confined to the larynx.

Zinc-65 in Foods and People. R. W. Perkins and J. M. Nielsen. Science **129**:94-95 (Jan. 9) 1959 [Washington, D. C.].

Trace amounts of radiozinc (Zn^{65}) are disposed in the Columbia River via Hanford reactor effluent water. The subsequent utilization of river water for irrigation permits concentration of this radioisotope in farm produce and its eventual deposition in man. The authors report on measurements of Zn^{65} in irrigation water, in farm produce, and in individuals utilizing these materials. The farm-produce and animal samples considered here were obtained from an irrigation project about 30 miles downstream from the Hanford reactors. By means of gamma-ray spectrometric techniques, measurable amounts of Zn^{65} were found in all the farm produce sampled from this location. The Zn^{65} concentrations found in milk, beef, and various vegetables from this land are shown in a table. The fact that the pasture grass contained a relatively high Zn^{65} concentration, as compared with the vegetables, is probably related to both the manner and the amount of irrigation, as well as to the fact that some difference in uptake exists between leaf and fruit portion of plants. The pasture grass was irrigated almost continuously, while the vegetables were irrigated only a few times during their growing season. In addition, the Zn^{65} may enter the grass by foliate absorption during irrigation as well as through the soil.

The relatively high Zn^{65} concentration in milk, as compared with that in pasture grass, indicated that a large amount of Zn^{65} is taken from the feed into the blood stream of the cow and translocated into the milk. The low Zn^{65} concentration found in beef samples may be explained by the fact that the animal in question was slaughtered in late winter and had been fed on essentially Zn^{65}-free foodstuffs for 3 or 4 months prior to that time. The Zn^{65} concentration in flesh, fat, and bone samples of another beef animal, which had spent its entire life in the same location, was about twice that in the first animal in the previous year. It was also observed that hair, liver, and bone concentrate zinc to a greater extent than other organs.

The gamma-ray spectrum of an individual who consumed approximately 0.1 and 0.7 kg, respectively, of meat and milk per day from the source mentioned is shown in a figure. Measurements were made in 12 other persons whose diet did not include food from the irrigation project but did, in some cases, include drinking water from the Columbia River. The presence of Zn^{65} in the amounts observed in no way constituted a hazard. Even the amount in the individual whose diet included meat, milk, and drinking water from the project was less than 0.01% of the total permissible body burden for this isotope. Also, even the highest Zn^{65} value in pasture grass was less than 5% of the maximum permissible concentration for human foods.

Irradiation of the Entire Body and Marrow Transplantation: Some Observations and Comments. E. D. Thomas, H. L. Lochte Jr. and J. W. Ferrebee. Blood **14:**1-23 (Jan.) 1959 [New York].

The authors mention previous experimental and clinical studies on whether infusion of normal bone marrow will induce recovery after exposure to irradiation that otherwise would prove fatal. They point out that there are dissimilarities between man and lower animals that make translation of the experimental data difficult. In this communication they present further clinical experience with whole-body irradiation and marrow transplantation by presenting the histories of 5 patients with acute leukemia who received total-body irradiation and intravenous infusion of normal marrow. An 8-month follow-up on a previously reported patient with chronic leukemia is included, and a review of the case of a person receiving nitrogen mustard and marrow is presented. Of several patients reported in this and in a previous communication, only 2 may be said to have obtained significant clinical benefit.

Possible reasons for this low incidence of improvement are suggested, and the difficulties involved in total-body irradiation and marrow replacement in man are discussed. The authors mention the difficulties in cell division resulting from ionizing radiation and the involved cessation of production of the circulating formed elements: platelets, leukocytes, and erythrocytes, which, in turn, is followed by bleeding and infection. Other problems discussed are possible immunological reactions to marrow transplantations, the number of cells required and obtainable from fetuses and from cadavers, the use of spleen, the time after irradiation at which marrow should be administered, and the technical difficulties involved in total-body irradiation.

Carotid Angiography in the Localization of Supratentorial Neoplasms and Hamartomata. P. F. J. New. Radiology **72:**35-41 (Jan.) 1959 [Syracuse, N. Y.].

In an attempt at assessment of the value of carotid angiography in the localization and diagnosis of supratentorial neoplasms and hamartomas, the author reports on 131 supratentorial neoplasms and arteriovenous malformations studied and verified between 1952 and 1957. Of the 131 lesions, 130 were examined by carotid angiography, and in 35 of these pneumography (encephalography and/or ventriculography) was employed in addition to angiography. Only one lesion was studied by encephalography alone. Of the 131 lesions, 88 (48.4%) were gliomas, 14 were meningiomas, 11 were metastases, and 18 were arteriovenous malformations. The results of these studies showed that cerebral angiography may be safer and less disturbing to the patient than pneumography. It is less time-consuming than a properly conducted pneumographic study.

It is postulated that most of the supratentorial space-occupying lesions are best examined first by carotid angiography. This method alone will frequently provide a pathological diagnosis in addition to a satisfactory localization, judged by the presently accepted criteria of accuracy. A high proportion of avascular space-occupying lesions will be accurately localized; most of the exceptions will be tumors limited to the occipital or parietal lobes, to the deep central portions of the hemispheres, or very early, small lesions. In a moderate number of cases additional pneumography, usually encephalography, will be required to provide additional information regarding the site and extent of the lesion. Unfortunately very extensive infiltrating gliomas can occasionally exist with no definite angiographic or pneumographic abnormality. A negative angiogram in the presence of reasonable clinical suspicion of a neoplasm should lead to pneumography, either within a few days, if the index of suspicion is relatively high, or within a few weeks, if suspicion is not so great initially but symptoms and signs are progressive. Suspected midline basal neoplasms are best investigated in the first instance by pneumography unless a meningioma or other vascular mass is suspected. The present aim is to use very rapid serial angiography to provide more detail of the circulation of the tumor and to employ angiography combined with pneumography in more and more cases, as the presently accepted criteria of accuracy of localization are not felt to be satisfactory.

BIOCHEMISTRY

The Immediate Effect of Hypophysectomy and Section of the Pituitary Stalk on the Urinary Steroid Excretion in Man. B. Hökfelt, R. Luft, D. Ikkos and others. Acta endocrinol. **30:**29-36 (Jan.) 1959 (In English) [Copenhagen].

The urinary excretion of steroids, including aldosterone, was studied immediately after operation in 2 men who had been subjected to hypophysectomy because of metastasis of malignant melanoma and in a woman in whom the pituitary stalk had been sectioned because of carcinoma of the thyroid with metastases. For evaluation of the steroid hormone production the 24-hour urinary output was collected without preservative, and stored in the refrigerator. Hypophysectomy was found to result in the disappearance of nonconjugated cortisol and cortisone, as well as of the corresponding tetrahydro derivatives. In agreement with this, there was a rapid and marked decrease in total 17-ketogenic steroids. Sectioning of the pituitary stalk was

found to produce an increase in the urinary output of these metabolites. Changes parallel to those in 17-ketogenic steroids were observed in the 17-ketosteroids. An increase in the urinary excretion of aldosterone was found in all 3 patients.

The Biology of Metacorticoid Hypertension. F. M. Sturtevant. Ann. Int. Med. **49**:1281-1293 (Dec.) 1958 [Lancaster, Pa.].

The search for effective treatment of essential hypertension has led to the laboratory exploration of many contributing factors, and 4 major types of experimental hypertension: neurogenic, renal, renoprival, and hormonal have been chiefly investigated. Green in 1953 and 1954, while reviewing the similarities and differences among human and experimental hypertensions, concluded that essential hypertension in human subjects is simulated most closely by the post-DOCA (desoxycorticosterone acetate) or metacorticoid syndrome. The author reviews all available information on this syndrome, pointing out that metacorticoid hypertension is a self-sustaining disease that is no longer dependent upon a continuing overdosage with DOCA and dietary sodium. The term "metacorticoid" in place of "post-DOCA" or "self-sustaining" was suggested by Selye, who likened this condition to the "metahypophysial" and "metathyroid" diabetic states described by Houssay.

Metacorticoid hypertension is produced in this author's laboratory by the subcutaneous implantation in 75-Gm. male rats of an extruded pellet containing a 2:1:1 mixture of DOCA, Carbowax 4000, and Flexowax C Light. Each pellet weighs 40 mg. Immediately after implantation, the rats are offered only 0.86% sodium chloride solution as drinking fluid, and are kept for a 3-month waiting period, after which they are considered to be "metacorticoid." The pellet remnants at this time contain only 0.2 to 0.3% of the original amount of DOCA.

The author concludes that metacorticoid hypertension is a self-sustaining disease in rats that is produced by temporary overdosage with DOCA and sodium. It may be characterized by an exaggerated urinary excretion of sodium and water, which is related to the duration of the disease, the sodium and water intake, and the blood pressure level. The urinary sodium/potassium ratio is elevated. When the rats are offered only isotonic sodium chloride solution or water to drink, there is a relative polydipsia; when they are offered a free choice between the two, a relative aversion to the sodium chloride solution is exhibited. The life expectancy of the metacorticoid rat is greatly reduced, although individual rats may live a year or more after DOCA implantation. The elevated blood pressure, cardiovascular reactivity, vascular lesions, disturbances in salt and water metabolism, and decreased life expectancy appear, to some extent, to be independent of each other. The maintenance of the disease is dependent upon the pituitary, the thyroid, and the kidney. Clinically active drugs cause transitory decreases of blood pressure in metacorticoid rats, although seemingly huge doses are often required.

Ionised, Protein-Bound, and Complexed Calcium in the Plasma in Primary Hyperparathyroidism. H. M. Lloyd and G. A. Rose. Lancet **2**:1258-1261 (Dec. 13) 1958 [London].

Calcium is present in plasma in the ionized, complexed, and protein-bound states. Although the 3 fractions are believed to be in equilibrium with one another, the level of the ionized calcium is regarded as the one most immediately related to the activity of the parathyroids. The authors report the results of measurement of the plasma calcium fraction in 17 patients with primary hyperparathyroidism. They are especially concerned to note the value of these measurements for the diagnosis of the disorder. In 16 of the 17 patients the condition was shown to be due to a single chief-cell adenoma, which was removed. In the remaining patient explorations of the neck and mediastinum were negative, but the diagnosis was not in doubt. The level of ionized calcium in the plasma was raised before operation in every patient, except one who was probably in temporary remission. After removal of the adenoma the level of ionized calcium always fell to normal or below normal; this fall was proportionately greater than the fall in the protein-bound fraction. It was inferred that the parathyroid hormone reduces the ability of the plasma proteins to bind calcium.

As a result of investigations on the patients, it was considered desirable to investigate the effect of administering parathyroid hormone to a healthy volunteer. Accordingly, the plasma calcium fractions were measured before and after 5 intramuscular injections of 400 U.S.P. units of Parathormone given at intervals of approximately 12 hours. Observations on this volunteer corroborated that parathyroid hormone reduces the ability of plasma proteins to bind calcium. It has been observed that it is possible for patients with normal total plasma calcium and with normal plasma proteins and pH to have a high ionized fraction. In such cases measurement of the ionized calcium in the plasma is a most valuable diagnostic aid. This measurement is also a valuable screening test for patients with "idiopathic hypercalciuria" in order to exclude primary hyperparathyroidism. If the level of ionized calcium in the plasma is raised, the hypercalciuria is not "idiopathic."

PUBLIC HEALTH

Second Chest X-Ray Survey of the Population of Amsterdam. A. Kalthofen, B. van Vliet and J. van der Zee. Acta. tuberc. scandinav. **36**:141-151 (no. 2-3) 1958 (In English) [Copenhagen].

A second chest x-ray survey was carried out on the population of Amsterdam between June, 1954, and August, 1957. Only persons over 14 years of age were included. The results of this second survey were compared with those of the first one carried out between April, 1951, and May, 1954. Among the 400,959 persons examined, 179 were found to have no previously detected pulmonary tuberculosis. In the first survey in which 411,111 inhabitants were examined, 379 persons with formerly unknown active pulmonary tuberculosis were detected. This was practically a 100% decrease; the number detected was smaller by 200, whereas the number of persons examined was only slightly smaller. Although the number of females examined was 12% larger than the number of males, the incidence of tuberculosis among females was lower by 58%. The maximal number of cases of tuberculosis was found among males of the age group 40 to 49, while the minimal number was found among females in the age group 50 to 59.

Pulmonary tumors were demonstrated in 185 persons during the second survey, that is, tumors were more numerous than tuberculosis. The 185 tumors included 19 that were benign, 31 that were suspected of possible malignancy, and 135 that were definitely malignant tumors. There were 96 patients in whom bronchial carcinoma had been clinically demonstrated; 24 of these had been operated on with good early result. In the first survey 176 pulmonary tumors (including 135 malignant ones) had been demonstrated.

A Rapid Test for Detecting Staphylococcus aureus in Food. E. Wilson, M. J. Foter and K. H. Lewis. Appl. Microbiol. **7**:22-26 (Jan.) 1959 [Baltimore].

Coagulase-positive staphylococci are responsible for approximately 75% of the food-borne illnesses of established etiology that have been reported in the United States during recent years. To determine the relation of a suspected food to staphylococcic food poisoning, the presence of enterotoxin should be demonstrated, but the methods available for this purpose are cumbersome. In lieu of demonstrating enterotoxin, a rapid method has been developed for detecting the bacteria that are known to produce enterotoxin, that is, the coagulase-positive staphylococci. The method allows detection of Staphylococcus pyogenes var. aureus in food within a 7-to-9-hour period. A selective culture technique in brain heart mannitol salt broth has been combined with the growth-accelerating effect of agitation in air during incubation. After the incubation with shaking of 4 to 6 hours at 35 C, the broth culture is used for a gram-stained preparation and for the coagulase test. Modifications of the method are proposed for use when circumstances preclude completion of the entire procedure in a single working day.

Studies were performed with experimentally contaminated ham, custard, creamed chicken, and milk. When Staph. aureus was present in these foods in pure culture, it was detected in 7 to 9 hours at levels ranging from 2,200 to 48,200 per gram, depending upon the food examined; whereas in the presence of 4 million to 15 million aerobic sporeformers per gram, staphylococci were detected at levels ranging from 17,000 to 43,500 in custard, and 19,000 to 167,500 in ham. In the presence of enterococci, salmonellae, and aerobic sporeformers totaling 105 million per gram, staphylococci were detected at the level of 235,000 per gram in a 9-hour total test period. These data indicate that the rapid test permits detection of Staph. aureus well below the level cited in the literature as the threshold for the production of sufficient enterotoxin to induce symptoms in man. Principal advantages of this new test are its speed, simplicity, and the ready availability and low cost of the equipment required. Speed of the test is important in relation to epidemiologic investigations of food poisoning outbreaks, and the relative simplicity of the procedure makes it a feasible quality control test for commercially prepared nonsterile foods. The test has not as yet been used for clinical materials.

The Age Factor in Postvaccinal Encephalitis. K. Berger and F. Puntigam. München. med. Wchnschr. **100**:2042-2043 (Dec. 26) 1958 (In German) [Munich, Germany].

Investigations were made in Austria on the incidence of postvaccinal encephalitis in relation to the age of the child at the first vaccination. It was found that this complication of vaccination not only shows a general increase among children who are vaccinated for the first time after the age of 3 years, in comparison with children who are vaccinated before they are 3, but the incidence rises further in successive age groups. The grouping according to age of 32 children in whom postvaccinal encephalitis developed during 1948-1953 and the grouping of the 69,706 vaccinations according to the ages of the children showed that, whereas in children vaccinated for the first time under 3 years of age 1 case of postvaccinal encephalitis developed in 9,958 children, for the age group of 4 to 5 years it was 1 case in 1,628, for the age group of 6 to 10 years it was 1 in 430, and for the age group of 11 to 14 years it was 1 in 85.

BOOK REVIEWS

New and Nonofficial Drugs: Containing Descriptions of Therapeutic, Prophylactic and Diagnostic Agents Evaluated by the Council on Drugs of the American Medical Association, 1959. Annual publication issued under direction and supervision of Council. Cloth. $3.35. Pp. 687. J. B. Lippincott Company, E. Washington Sq., Philadelphia 5; 4865 Western Ave., Montreal 6, Canada, 1959.

This book contains monographs on drugs which have been evaluated on the basis of available scientific data by consultants and members of the A. M. A. Council on Drugs. It begins with a statement of the principles governing the evaluation of the drugs which are described. The 1959 edition includes new Council monographs that have appeared in THE JOURNAL since the 1958 edition. Monographs on drugs which either have been included in the book for 20 years or are no longer commercially available have been deleted. The current edition contains approximately 500 monographs, of which 42 are new. A generic listing of available preparations and their strengths and sizes is given with each monograph. Trade names are listed at the end of each monograph and also in the index. Among the important new monographs are those for anileridine hydrochloride, dextro propoxyphene hydrochloride, iproniazid phosphate, oleandomycin phosphate, prochlorperazine, and ristocetin. In view of its admirable coverage of newer drugs, whether or not their usefulness has been established, all physicians and students of medicine should consider the purchase of this annual publication as a guide to drug therapy.

Television in Science and Iudustry. By V. K. Zworykin, E.E., Ph.D., D.Sc., E. G. Ramberg, Ph.D., and L. E. Flory, B.S. Cloth. $10. Pp. 300, with illustrations. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16; Chapman & Hall, Ltd., 37-39 Essex St., Strand, London, W. C. 2, England, 1958.

The authors explore the function of closed-circuit or industrial television and describe the tools which have been developed to realize it. A brief historical introduction in the first chapter covers the various attempts to televise in the prescientific era, developments during the era of speculation, and final emergence into the mechanical and electronic era. In chapter 2 the principal applications of television in industry, research, medicine, education, commerce, military affairs, and home and farm work are outlined. In chapter 3 the equipment which has been developed for closed-circuit television is described in detail, including the design and circuitry of the more conventional camera equipment, the miniaturization made possible by the transistors and 0.5-in. vidicons, the operation of color and stereo-television apparatus, and the television microscope.

In chapter 4 the status of closed-circuit television in 1957 is reviewed and examples are cited from actual practice in sufficient detail to enable the reader to judge the situations known to him in which closed-circuit television could be most effective, what equipment would be needed, and how it should be used. Complete references are given to the technical literature. In chapter 5 an attempt is made to forecast the future development of closed-circuit television, with a comparison of performance limits of vidicon and flying-spot television microscopes in the ultraviolet given as an appendix.

The reader of this book should receive an excellent basic education covering the birth, development, and growth of television. He should also become familiar with the many and varied uses of this versatile medium as it has been put to work in science and industry. The section on microscopy is especially detailed and contains valuable reference sources. The discussion of permanent and portable television apparatus as used in medicine is also quite complete for the period covered. Unfortunately, the speed in development and refinement of television apparatus in the past two years somewhat dates this book, but for those who are planning to enter the field of television it should serve as an excellent foundation. This book will be of primary interest to those who would like to familiarize themselves with the technical aspects of television.

Diseases of Children in the Subtropics and Tropics. By H. C. Trowell, O.B.E., M.D., F.R.C.P., Senior Specialist Physician, Pædiatric Unit, Mulago Hospital and Makerere College, University College of East Africa, Kampala, Uganda, and D. B. Jelliffe, M.D., M.R.C.P., D.C.H., Visiting Professor of Tropical Medicine, Tulane University, New Orleans. Cloth. $18.50. Pp. 919, with illustrations. Williams & Wilkins Company, 428 E. Preston St., Baltimore 2; Edward Arnold (Publishers) Ltd., 41-43 Maddox St., London, W. 1, England, 1958.

Most of the world's children are born and live in the subtropics and tropics. One would suppose that special textbooks dealing with the problems of these children would be available, but such is not the case. Most of those who are concerned with pediatrics in tropical areas have either been trained in the West or have studied textbooks written from the standpoint of Western medicine. The authors have prepared this volume, with the

These book reviews have been prepared by competent authorities but do not represent the opinions of any medical or other organization unless specifically so stated.

assistance of about 70 contributors from all over the world, to meet an obvious need. Some of the communities in which these contributors work are Madras, India; London; Sydney, Australia; Uganda; Lagos, Nigeria; Manus, New Guinea; Buenos Aires; Colombo, Ceylon; Paris; Singapore; Bogotà, Colombia; Calcutta; Dakar, South Africa; Jamaica; Kenya; New Orleans; and Washington, D. C.

This book covers the broad field of diseases of children, but it does not attempt to be another standard textbook of pediatrics. Those maladies which are cosmopolitan, such as the infectious diseases of childhood and the commoner disorders of the respiratory and nervous systems, are presented briefly, and attention is called to unusual characteristics which may be due to the tropical environment. Numerous conditions which appear almost exclusively in the tropics and which a pediatrician in the temperate zones would rarely if ever see are described in detail. Among these are kwashiorkor, tropical eosinophilia, paragonimiasis, cholera, Indian childhood cirrhosis, veno-occlusive disease of Jamaica, maduromycosis, yaws, pinta, leprosy, African and Brazilian trypanosomiasis, visceral leishmaniasis, schistosomiasis, loiasis, dracontiasis, and vomiting sickness of Jamaica.

Much space is devoted to such factors that tend to alter or aggravate disease processes as poverty, illiteracy, ignorance, overwork, local superstition, heat, humidity, and malnutrition. These forces are met to some extent in the temperate zone, but the violence of their impact on the health of children cannot be appreciated until one reads of their influences in the tropics. The material is presented in interesting, readable form. Since most of the contributors were trained in British schools, the style is distinctly British and altogether charming. This telling description of a child with kwashiorkor is an example: "an unpleasant picture of unwanted misery." The book is well illustrated, and the various chapters give a brief but adequate list of references. This book should be required reading for physicians who deal with children in the subtropics and tropics. It could also be read with profit and pleasure by any physician who is interested in pediatrics in its broadest sense.

Grosse Nervenärzte. Band 2: 22 Lebensbilder. In Gemeinschaft mit E. H. Ackerknecht et al. Herausgegeben von Kurt Kolle. Cloth. 29.40 marks; $7. Pp. 251, with 24 illustrations. Georg Thieme Verlag, Herdweg 63, (14a) Stuttgart, West Germany; [Intercontinental Medical Book Corporation, 381 Fourth Ave., New York 16], 1959.

This is a sequel and companion to an excellent book reviewed in THE JOURNAL of May 19, 1956, page 294. The present volume offers biographies of Golgi, Nissl, Alzheimer, Brodmann, Cécile and Oskar Vogt, Helmholtz, Quincke, Esquirol, Meynert, Wernicke, Meyer, Gaupp, Marie, Babinski, Head, von Economo, Horsley, Dandy, Vincent, Dubois, and Simon. Each biography is the work of an author who is himself distinguished as a neurologist or psychiatrist, and those chapters which were originally written in English or French appear here in German. A concluding chapter sketches the development of institutions for teaching and research in neurology and psychiatry in France, Great Britain, Italy, Russia, Switzerland, Belgium, Holland, Scandinavia, Spain, and Portugal. Each chapter is illustrated with a portrait of the subject and closes with a brief bibliography. There is an index of names.

Thanks to both a felicitous choice of contributors and painstaking coordination by the editor each chapter gives not only an instructive account of the subject's scientific work but also an interesting picture of his personal life. In connection with the former there is enough detail, accurately presented by an authority, to make the book valuable to students interested in the development of fundamental ideas in scientific medicine. Examples are the thinking and experiments of Helmholtz on the nature of the nervous impulse and the growth of the idea of occupational therapy in the institutional practice of Simon. In connection with personal lives there are innumerable episodes and oddities, all related with tact and understanding. Examples taken at random are Calmiel's deception of Esquirol with a feigned grand mal seizure, Cushing's unfortunate remark that is believed to have started a life-long hostility between him and Dandy, John Horsley's unwillingness to paint from nude models, and Wernicke's enthusiasm for bicycle trips that led to a fatal collision with a lumber wagon in the Thuringian forest. This book is recommended especially to students of neuropsychiatry and of the history of medicine.

Pictorial Handbook of Fracture Treatment. By Edward L. Compere, M.D., F.A.C.S., Professor and Chairman of Department of Orthopaedic Surgery, Northwestern University Medical School, Chicago, Sam W. Banks, M.D., F.A.C.S., Associate Professor of Orthopaedic Surgery, Northwestern University Medical School, and Clinton L. Compere, M.D., F.A.C.S., Associate Professor of Orthopaedic Surgery, Northwestern University Medical School. Fourth edition. Cloth. $7.50. Pp. 448, with 268 illustrations, line drawings by Harold Laufman, M.D., F.A.C.S., and Jean McConnell. Year Book Publishers, Inc., 200 E. Illinois St., Chicago 11, 1958.

This edition contains many changes in text and in thought from previous editions, and it represents a distinct advance over earlier volumes. The fracture treatment outlined is simply worded, direct and to the point, and amply illustrated. There are a minimum of those roentgenograms which so often are difficult to interpret when reproduced. The technique and methods explained are the standard ones generally in use throughout the United States. There is little attempt on the part

of the authors to emphasize favored treatments of their own in certain fractures. They have in some instances described several methods of treating the same problem, but these methods are sound throughout and simply represent variations in technique that may be used to gain the same end.

This handbook is excellent for teaching purposes at the levels of both the medical student and the surgeon interested in orthopedics. It should be in the library of every general practitioner as well as that of the orthopedist. The table of contents shows excellent organization, beginning with some introductory remarks on fractures and their pathology with special reference to healing, and going on to diagnosis, emergency treatment, definitive treatment, and principles of care. The latter two-thirds of the book is so organized that one can turn to the part of the body involved and quickly find the type of fracture in which one is interested. Minor points of dispute might be raised on the discussion of the common ankle fractures, since there is a growing tendency throughout the country to perform open reduction and internal fixation more frequently than the writers advocate. Their conservatism in treating this problem gently is to be recommended, however, since what is standard practice in the hands of the expert is not always feasible in the hands of the general practitioner. This handbook is highly recommended to all traumatic and orthopedic surgeons and to students who are interested in fractures.

The Pneumoconiosis Problem: With Emphasis on the Role of the Radiologist. By Eugene P. Pendergrass, M.D., Professor of Radiology, University of Pennsylvania School of Medicine, Philadelphia. Cloth. $6.75. Pp. 146, with 53 illustrations. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill.; Blackwell Scientific Publications, Ltd., 24-25 Broad St., Oxford, England; Ryerson Press, 299 Queen St., W., Toronto 2B, Canada, 1958.

This book contains the entire manuscript of the Caldwell lecture which the author gave at the annual meeting of the American Roentgen Ray Society, Oct. 1, 1957. It is not a complete treatise on pneumoconiosis. Many phases of the problem of silicosis, asbestosis, and coal workers' pneumoconiosis are not considered. The effort has been directed largely toward a discussion of guide lines helpful in the interpretation of shadow patterns in the roentgenograms. These were gathered from records of silicosis in some 500 workers in industry who were exposed to free silica with essentially no contaminating dust. Many cases were followed up for over 20 years.

This book is aimed at interesting more radiologists in pneumoconiosis. The radiologist not only plays an important role in the diagnosis but also has increased opportunities for estimating pulmonary disability and complementing pulmonary physiological studies. The specific lesions of the three pneumoconioses are described, with emphasis on the necessity of evaluating shadows produced by blood vessels which simulate the pattern of nodulation. Many of the lesions of various forms of pneumoconiosis are not pathognomonic in themselves and simulate other diseases such as tuberculosis and Boeck's sarcoid. The roentgenographic appearance of the various pathological lesions is fully discussed and correlated with present concepts of disturbed pulmonary physiology in those states. Emphasis is placed on improving fluoroscopic and roentgenographic studies of chest physiology to improve present methods of estimating the extent of pulmonary disability. The most important chapters deal with the history of pneumoconiosis, types of pneumoconiosis, pathogenesis, and the classification of the roentgenologic manifestations. This monograph should be of value not only to radiologists but also to internists, chest physicians, industrial physicians, industrial hygienists, pulmonary physiologists, bronchologists, industrial engineers, thoracic surgeons, and medical students.

Radiation Biology and Medicine: Selected Reviews in the Life Sciences. Edited by Walter D. Claus. Prepared for United States Atomic Energy Commission. Cloth. $11.50. Pp. 944, with illustrations. Addison-Wesley Publishing Company, Inc., Reading, Mass., 1958.

The output of research publications on ionizing radiation since the advent of the atomic bomb and establishment of nuclear reactors has been truly staggering. In addition to thousands of individual journal articles and reports from governmental agencies, many volumes of symposiums on specialized topics have appeared. This book serves a real function in bringing together in a series of reviews an up-to-date account of the impact of atomic energy on such diverse fields as genetics, physiology, agriculture, and medicine, to name but a few, as well as on such varied but related problems as growth and aging, ecology, and bioeconomics. The editor makes it clear at the outset that the nature of the task has forced selection of only certain areas for review and, furthermore, that the scope of presentation has been limited essentially to work performed or in progress in the United States. Despite this fact, the coverage is excellent, and the 33 chapter headings have been selected with care. The authors present their specialties with competence and have written concisely and authoritatively, yet without "writing down" to their varied audience. Those who wish to refer directly to source material will welcome the extensive bibliographies accompanying each topic. The reviews of the medical uses of atomic radiation point up the wide application of radioisotopes today, as well as the development of accelerators and the nuclear reactor itself as a device for medical therapy and diagnosis. Already some 350 devices using radioactive

cobalt (Co^{60}) as a teletherapeutic source are in use. The problems of instrumentation and dosimetry are well covered, and scanning technique, probably the most outstanding development in medical instrumentation within the past few years, comes in for its share of attention. In these days of international hysteria and debate, the basic material presented in this book should go far in providing factual information for the intelligent reader concerned about radiation hazards.

Reversible Renal Insufficiency: Diagnosis and Treatment. By Donald H. Atlas, M.D., Ph.D., F.A.C.P., Associate Professor of Medicine, Northwestern University School of Medicine, Chicago, and Peter Gaberman, M.D. Cloth. $7. Pp. 233, with 19 illustrations. Williams & Wilkins Company, 428 E. Preston St., Baltimore 2, 1958.

The authors' experiences at the Cook County and Mt. Sinai hospitals in Chicago and a thorough review of the literature on the pathology, pathological physiology, and therapy of acute renal failure, with oliguria and uremia, have served as the basis for this monograph. More space is devoted to a review of conditions associated with elevated plasma calcium levels than to all forms of therapy for acute and chronic renal failure (50 compared to 40 pages). The review of hyperparathyroidism, "milk-alkali" syndrome, sarcoidosis simulating hyperparathyroidism, and other conditions associated with hypercalcemia is well worth study, as are the sections on lupus, gouty kidney, and other renal disorders. This can be recommended as a sound guide to the management of the oliguric and polyuric phases of acute renal damage.

Physiology of Exercise. By Laurence E. Morehouse, Ph.D., F.A.C.S.M., Professor of Physical Education, University of California at Los Angeles, and Augustus T. Miller Jr., Ph.D., M.D., Professor of Physiology, University of North Carolina Medical School, Chapel Hill. Third edition. Cloth. $4.75. Pp. 349, with 40 illustrations. C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, 1959.

This book constitutes a compact summary of material conventionally taught in connection with athletics. The opening chapters contain some of the classic fundamental facts about the histology, biochemistry, and physiology of voluntary muscles, with some of the more recent findings in these fields. Subsequent chapters are concerned with skills, muscular strength and hypertrophy, stress and endurance, energy requirements and efficiency, fatigue and recovery, training, nutrition, medical aspects of exercise, and physical fitness. Each chapter is followed by a bibliography, which is essential because of the brevity of many parts of the text. The book ends with a glossary, a convenient table of conversion factors for weights and measures, and a good index.

The scientific value of this book could have been greatly increased if advantage had been taken of the results of research in fields other than athletics, by greater concreteness in the discussions of the neurophysiology of muscular tone, by more frequent use of the precise vocabulary of kinesiology, and by eliminating some unfortunate terms, such as linear, lateral, eccentric, and concentric, inherited from the uncritical past. The statement (page 77) that "an attempt to contract the biceps voluntarily will not produce the movement" ignores the existence of the art of muscle control. The statement (page 253) that swimming develops "long" muscles is not borne out by the illustrations showing four men, one a swimmer, whose extremities are clearly of the same absolute and relative length. In most respects, however, the book deserves commendation as a compendium of scientifically verified facts of importance in physical education.

Lesions of the Lower Bowel. By Raymond J. Jackman, M.D., M.S., Associate Professor of Proctology, Mayo Foundation, Graduate School, University of Minnesota, Rochester. Cloth. $15.50. Pp. 347, with 131 illustrations. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill.; Blackwell Scientific Publications, Ltd., 24-25 Broad St., Oxford, England; Ryerson Press, 299 Queen St., W., Toronto 2B, Canada, 1958.

This is an excellent volume. The color plates depicting polyps, carcinomas, the lesions characteristic of ulcerative colitis, and other frequently seen lesions (as well as a few rare ones) are superb. This monograph is not a book on proctology or proctologic surgery per se, and apparently it is not intended to replace such a book in the physician's library. The style is rather that of a diagnostic study, dealing with the methods of performing proctologic examinations and the recognition of lesions most frequently encountered. This idea has been carried out clearly, concisely, and authoritatively.

The chapter on the technique of proctoscopy is well done. Step by step the reader is instructed in indications, preparation of the patient, positions, and the actual conduct of anoscopy and proctosigmoidscopy. The accompanying illustrations should clear up many misunderstandings held by beginners in these procedures. The technique of transrectal needle biopsy as it applies specifically to prostatic biopsy is included, surprisingly. Fifty-six black-and-white illustrations and a color atlas of 75 plates add a great deal to its usefulness. There are 28 chapters, each indexed with a subject-matter heading for easy reference. A wide diversity of medical men—the general practitioner, the gastroenterologist, the proctologist, and the general surgeon—will find this book a valuable addition to their working libraries.

QUESTIONS AND ANSWERS

SPEED OF TRANSFUSION

To the Editor:—*What is considered the maximum rate of administration of whole blood during transfusion?* *H. E. Rendel, M.D., Mexico, Ind.*

Answer.—The maximum rate of administration of whole blood during transfusion is considered to be about 250 ml. per minute. In actual practice the maximum rate is related to the amount of blood that can be forced through a 15-gauge needle into an accommodating vein or veins. Several problems may result from the rapid administration of a large amount of whole blood. The first is the remote possibility of citrate intoxication, although this rarely, if ever, happens. A second complication that can follow the rapid administration of whole blood in massive amounts is thrombocytopenia with serious clotting disturbance. This has occurred clinically and can be produced experimentally. Overloading the circulation can result in pulmonary edema. Good clinical judgment is always necessary in deciding how much blood should be given in what period of time.

DIAGNOSIS OF RENAL TUBERCULOSIS

To the Editor:—*In this area, there is a difference of opinion as to the best method of identifying tuberculous organisms in the urine. Staff members at one hospital insist that urine cultures provide the most consistent results. At another hospital, they believe that urine cultures are not as effective as guinea pig inoculation. Should not all methods, namely, acid-fast stain, culture, and guinea pig inoculation, be used whenever possible? There is also a difference of opinion regarding the collection of the urine sample. Some believe that only a 24-hour specimen provides any degree of accuracy, while others accept a morning specimen.*

Carl K. Pearlman, M.D., Santa Ana, Calif.

Answer.—No dependence should be placed for diagnosis, especially for initial diagnosis, solely on microscopic examination of the urine, especially voided urine, because of the constant presence about the external urogenital orifice of saprophytic, acid-fast bacilli microscopically indistinguishable from Mycobacterium tuberculosis. These deceptive saprophytes are only with difficulty excluded from urine specimens, even from catheterized specimens. Urine for bacteriological examination should be obtained by means of a sterile catheter to avoid the inevitable contamination of voided specimens. If voided urine is used, 24-hour specimens are preferable because they are more likely to contain tubercle bacilli than a single voided or catheterized specimen, since the bacilli are often shed intermittently. However, 24-hour specimens are usually heavily contaminated unless refrigerated and require decontamination with consequent loss of some of the tubercle bacilli.

The controversy over culture vs. guinea pig inoculation continues in the absence of general acceptance of a culture procedure. The number of cultures, decontamination, and concentration methods presented in the literature testifies to general dissatisfaction with (but not necessarily to inferiority of) existing procedures. A strictly fair comparison between culture methods and guinea pig inoculation requires that the same amount of the same material be used to inoculate, as nearly simultaneously as possible, guinea pig and cultures in a sufficiently large number of cases to yield a statistically significant result. The patients selected should be those known to be shedding tubercle bacilli in numbers sufficiently small to test the sensitivity of each method, or else the comparisons should be based on such quantitative data as colony counts and rapidity of growth. It is also essential that culture methods be carried out exactly as recommended by their sponsors. Such studies are rare and, with regard to urine, virtually nonexistent. In too many studies of this sort, human and other variables, some known and some unknown, seem to have played a significant role.

There are now probably a dozen or more culture methods which, properly handled, yield diagnostic results as reliable as, and often more rapidly than, guinea pig inoculation. Discussions of these may be found in the literature. In any case, the identity and virulence of any acid-fast organism isolated in pure culture from urine or other contaminated material (such as sputum) must, at least for primary diagnosis, be verified by guinea pig inoculation. Additional physiological tests other than, or in addition to, guinea pig inoculation may be required in the case of some of the so-called atypical acid-fast bacilli recently recognized as possibly involved in tuberculosis-like infections. The use of guinea-pig inoculation alone would fail to detect a number of these atypical strains. Furthermore, pure cultures are desirable for sensitivity testing.

The answers here published have been prepared by competent authorities. They do not, however, represent the opinions of any medical or other organization unless specifically so stated in the reply. Anonymous communications cannot be answered. Every letter must contain the writer's name and address, but these will be omitted on request.

The more methods that are used in any diagnostic test, especially in biological diagnostic tests such as cultural procedures, the more likely is a reliable result to be obtained (assuming minimal probability of obtaining a positive result). For example, the use of cultures and guinea pig inoculation together is more likely to give a dependable result in a minimal time than the use of either alone. The inoculation of 10 culture tubes is preferable to the inoculation of 1. In short, the wider the net, the more the fish. So far as procedures are concerned no specific recommendation need be made, but it may be said that, for urine, centrifugation of the specimen for 30 minutes at 4,500 rpm is necessary. If there is no flocculation or sediment a small amount of flocculating agent, such as ferric chloride, in urine made slightly alkaline with sodium bicarbonate, is advisable to gather the bacilli and sediment them. If the sediment is not heavily contaminated it may be used to inoculate, directly, slants of some medium such as the Holm-Jensen-Lowenstein medium, the Frobisher-Petragnani medium, or one of the later-devised blood or egg mediums. Contamination may be controlled by adding penicillin and cycloheximide to the culture medium. If heavily contaminated, preliminary decontamination with sodium hydroxide or sulfuric acid may be used, as for sputum, but these are toxic to M. tuberculosis and are to be avoided in favor of the antibiotics.

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CORNEAL HERPES SIMPLEX

To the Editor:—*A patient has had recurrent dendritic ulcer of the right cornea for five years. Recurrences are two to four weeks apart, and each attack has left the cornea partially denuded and has caused an irregular surface. Attacks last one or two weeks. Several physicians have recommended a corneal transplant as a means of preventing future ulcerations and to improve the present vision (20/400 in this eye). About one-half of the corneal surface has been affected. X-rays of the sinuses revealed a mild pansinusitis, and in July the ethmoid and sphenoid sinuses were operated on and the nasal septum was straightened. Autogenous vaccine was prepared and is still being given. The patient has taken vitamin B complex daily for the past five years, eats well, feels well, and has no chronic inflammatory lesion of any kind. The eye has been cauterized at least 20 times with iodine; the entire cornea has been scraped about three times. Every known ophthalmic ointment has been used, and all eventually caused irritation and had to be replaced by a milder preparation; 20 cc. of immune serum globulin has been injected intramuscularly on two occasions one month apart. Also, 20 smallpox vaccinations were administered twice a week. Large amounts of vitamin C are taken daily. It was recommended that, after subsidence of each acute phase, an ophthalmic ointment or solution be given twice a day, but since this has not prevented a recurrence of further ulcers all medicaments have been withdrawn. What further steps can be taken to stop the attacks? Is any research being done at present for such a condition and, if so, where? Have any ophthalmologists in the United States had a number of such cases, and were they successful in treating such a stubborn case? Would the use of contact lenses improve the vision, or would they further damage the cornea or excite an attack? Are sufficient statistics available to indicate or warrant transplantation in this case?* *M.D., New Jersey.*

Answer.—In the past 10 years there has been a marked increase in the frequency of chronic herpetic corneal ulcers, especially of those that lead to perforation. This is attributed to the widespread use of corticosteroids and antibiotics in the treatment of herpes simplex infections. The herpes simplex virus is one of the smallest known and is not affected by topical or systemic medication. Recurrences are brought about by multiplication of the virus within the tissues because of reduced local tissue immunity. They may be associated with upper respiratory infections, fever, menstruation, and minor ocular trauma, but for the most part no cause can be found. The mainstay of treatment has been destruction of the cells containing the virus with iodine, ether, or similar chemical cautery. As

the inquiry indicates, many medicaments have been recommended to prevent recurrences and these are frequently without value.

Much research is being carried out on virus infections of the eye. The current status of these studies is synopsized in the Symposium on Viral Keratoconjunctivitis (*Am. J. Ophth.* **43**:3 [part 2], 1957). Many ophthalmologists in the United States have seen a large number of patients with corneal herpes simplex, but because of the nature of the disease no particular method of therapy is consistently successful. A contact lens will improve vision only if the visual diminution results from an irregularity of the cornea. Generally, a contact lens is contraindicated in an eye in which herpes simplex infections recur frequently.

Therapeutic lamellar grafting is indicated in patients with chronic superficial ulcers that fail to heal after two or three months' treatment; in those with much deeper, more extensive ulcers that fail to respond in two or three months to a variety of treatments; to prevent frequent recurrences of dendritic ulcers; and in patients with chronic disciform ulcers that have perforated. Contraindications to lamellar keratoplasty are secondary infection by bacteria or fungi, glaucoma, and iridocyclitis. Lamellar keratoplasty has been performed in a number of patients with corneal herpes simplex. Frequently a penetrating graft is necessary as a secondary procedure to improve vision. The purpose of the therapeutic lamellar graft is to remove all of the diseased corneal tissue containing the virus. Since only a portion of the cornea is removed and the globe is not entered, the operation is not as technically difficult as a penetrating keratoplasty. It may frequently be associated with a gratifying improvement in vision. With a history of recurrent infections over a period of five years, this would seem to be an ideal case for corneal transplant, as suggested by the physicians who have already seen this patient.

BLOOD PRESSURE TRACINGS

To the Editor:—*Has anything practical and inexpensive been developed by which blood pressure may be graphically recorded in the office, thus removing the human element in its accurate interpretation? Do the occasional relatively wide variations in blood pressure readings recorded by different "competent" physicians or even by the same observer on repeated examinations represent true labile changes?* *M.D., California.*

Answer.—No practical, simple, and inexpensive instrument is available for graphically recording blood pressure in the office. The techniques used in physiological and crime detection laboratories are complicated and delicate. Furthermore, these instruments do not indicate precisely the level of diastolic pressure, concerning which there is widespread lack of unanimity even with the auditory method. The wide variations in observed blood pressure readings under accurately controlled conditions do represent actual fluctuations in pressure, but this fact need not be ominous or lead to concern. In the absence of pheochromocytoma, wide and rapid fluctuations are commonly seen as the result of the state of mind—rage or fear in extreme instances, concern, apprehension, a bad day or night, the novelty of coming to a strange physician, or where a momentous decision is to be expected. A man who has been examined for life insurance may be somewhat apprehensive. His pulse is rapid and his blood pressure elevated, so either he is rejected or his premium is increased. When he is seen by the family physician or a consultant who gains his confidence, his pressure is repeatedly found to be normal. One can observe a rapid fall in pressures as the patient's mind is directed from the realization that the pressure is being taken, and often it can be observed to rise as he again becomes aware of the procedure. No matter how satisfactory and how frequently this fall to normal may be observed in the office of a neutral observer, the pressure will invariably be elevated when he returns to the insurance examiner. Similar reactions are seen frequently in women referred for a gynecological examination and, in World War II, in young healthy men examined for officers' training. The above facts are the basis for the sedation test, in which the subject is given a relatively large dose of a sedative or tranquilizer, after which serial readings are taken every half hour for five or six periods. This may be considered a legitimate procedure in hyperreactors if the examining physician is informed of the program and is aware that no true blood pressure reducing or vasodilating preparation is being used. Thus, these fluctuating readings represent actual variations in levels of pressure, but the interpretations of these changes should be made with caution and after ascertaining the facts and behavior behind the changes.

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ERYSIPELAS AND CANCER

To the Editor:—*Recently, a lawyer asked about an article which advocated the use of erysipelas in the treatment of advanced carcinomatosis. The lawyer's secretary has generalized carcinomatosis, and he would like to know if she could be benefited by this treatment. Where and by whom is the experimental work on this form of treatment being done?* *A. A. Fink, M.D., Topeka, Kan.*

Answer.—The observation that in one patient who had been operated on five times for sarcoma there was no recurrence after two attacks of erysip-

elas prompted the late Dr. W. B. Coley to study the effects of induced streptococcic infections on tumors. Difficulties encountered included patient immunity and occasional death from infection. Heating or filtration appeared to destroy the effectiveness of the culture. Eventually, a mixture of toxins from erysipelas producing streptococci and Serratia marcescens came to be known as Coley's toxin. This material received extensive trial. All but a few preparations were weak and variable, but there are a number of reported tumor-free survivals of 20 to more than 40 years' duration. A review of the influence of bacterial infection and of bacterial products (Coley's toxin) on malignant tumors in man has been made by Nauts and associates (*Acta med. scandinav.* [supp. 276] **145:**1, 1953). Unfortunately, it is impossible to determine the percentage of objective remissions achieved from the available data. The effectiveness of this form of therapy appears to be related to the production of a severe local inflammation augmented by a systemic febrile reaction. Daily injections for many months, sometimes interspersed with short rest periods, are required. It is necessary to provide means for evacuation of large quantities of necrotic tumor tissue to prevent toxemia from absorption. A more recent extension of this work has been the use of purified polysaccharides from bacterial cultures such as S. marcescens, but the reported results from such therapy are not impressive.

REACTION TO CHRYSOTHERAPY

To the Editor:—*A patient with rheumatoid arthritis received an initial injection of 25 mg. of gold sodium thiomalate. Twenty-four hours later he experienced swelling and itching of the scrotum and lower lip. The only other drug taken concurrently was dextropropoxyphene (two capsules every three hours for two doses). The literature concerning toxic reactions to gold mentioned pruritus and dermatitis but not an immediate urticarial reaction. Could the gold have caused this reaction?* *Paul Gerber, M.D., Philadelphia.*

Answer.—Immediate allergic reactions to the administration of gold, while rare, are not unknown. Either this or the other medicament taken concurrently could have been the precipitating factor in this patient. Probably 10% or less of patients will note an acute exacerbation of rheumatic symptoms within 24 to 48 hours after the administration of gold, and this is generally considered to be an allergic manifestation. It is not an indication for discontinuing treatment but rather for decreasing the size of the dosage. If the case that forms the basis of this inquiry is one in which gold is indicated, a single dose of 1 mg. of gold sodium thiomalate could be given intramuscularly at a future date, and if no untoward reaction occurred to this dose an injection of 5 mg. could be given one week later. If no reaction is noted the dose could then be increased 5 mg. each week to a maintenance dose of 25 mg. The appearance of allergic manifestation after the administration of any of these injections would be a sign for discontinuance of this type of therapy. Because of the potential toxicity of chrysotherapy, it seems wise when instituting such treatment in any patient with rheumatoid arthritis to use only 5 or, at most, 10 mg. of gold as an initial dose and to increase to the maintenance dose of 25 or 50 mg. by increments of not over 10 mg. per week.

BOILED PEANUTS FOR DIARRHEA

To the Editor:—*A 34-year-old woman who had had intermittent abdominal pain for four years had an exploratory laparotomy in November, 1956. At that time a terminal ileitis involving the distal 10 in. of the ileum was found. The terminal 2 ft. of ileum were resected and an end-to-side ileoascending colostomy was performed after closure of the ileocecal opening by inversion. There were no skip areas, and no other abdominal lesions were noted. The pathological report showed chronic granulomatous inflammation of the terminal ileum compatible with regional ileitis. After operation the patient recovered, but diarrhea has persisted and has not responded to ordinary therapy. In February, 1957, a complete gastrointestinal examination was done with negative findings and she was given prednisone; this therapy was continued throughout the year with the patient gradually returning to normal weight and vigor. Therapy was stopped in March, 1958, but she continued to have six to eight stools a day with mucus but no blood. The patient has found that if she consumes a pint or more of boiled peanuts daily the symptoms are controlled. This does not happen with folic acid, vitamin B_{12}, antispasmodics, pancreatin, or any other dietary measure. On several occasions when the peanuts were not taken the diarrhea returned, only to disappear again with their ingestion. Please give information that would lead to some specific form of therapy.*

C. H. Richardson Jr., M.D., Macon, Ga.

Answer.—The control of diarrhea by boiled peanuts in a patient who has had a resection of the distal ileum is a most interesting observation. This consultant knows of no explanation for this, but peanuts and other nuts contain a number of constituents that have physiological or pharmacological action. Several glycosides that have a goitrogenic action have been isolated from edible nuts (*J. Nutrition* **66:**291, 1958). The outer red skin-covering of certain nuts has been found to contain anthocyanins and tannins. Such compounds might conceivably decrease the activity of the intestinal mucosa. An alcohol-soluble material has

been found in peanuts which may have an influence on blood coagulation in hemophilia. Further study of the effect of boiled peanuts in the therapy of diarrhea appears to be warranted.

METABOLIC RATE IN AN AMPUTEE

To the Editor:—*Please give advice on the determination of basal metabolic rate in a patient suspected of having hypothyroidism. The difficulty lies in the fact that this patient has had both legs amputated at midthigh because of gangrene, complicating diabetes mellitus. The problem is the determination of the patient's body surface. Her blood cholesterol level is within normal limits. The protein-bound iodine and radioactive iodine uptake tests are not locally available.*

Leo Lewin, M.D., Mount Arlington, N. J.

Answer.—The true surface area of this patient can be determined with reasonable accuracy by making a series of linear measurements of body parts and applying the "linear formula" as described by DuBois and DuBois (*Arch. Int. Med.* **15**:868, 1915). Unfortunately, this will not solve the problem. Normal standards for calories per square meter (or liter of body water) are entirely empirical, i. e., they are merely average values observed in healthy, intact persons. They are not applicable to amputees because the various body parts are far from uniform in terms of calories per square meter. For example, the bilateral, midthigh amputation probably reduced this patient's surface area by about 30% but her basal heat production by less than 10%. The simplest procedure is to use the patient's preamputation height and weight in calculating a basal metabolic rate in the usual fashion; then, in order to make allowance for a 10% reduction in calorie output due to the amputation, set the "normal range" for this patient at −25% to +5%. In view of the uncertainty in this procedure and because of the propriety of conservative management of hypothyroidism in the presence of diabetes, a protein-bound iodine level determination would be desirable. This can be done on a mailed plasma sample.

USE OF THIOPENTAL IN LABOR

To the Editor:—*How soon does thiopental reach the infant circulation if used in cesarean section? What are its advantages and hazards?*

D. D. Dieter, M.D., Eustis, Fla.

Answer.—On the basis of work by Crawford (*Brit. J. Anaesth.* **28**:146, 1956) and others, it is generally believed that thiopental, if used for cesarean section, passes immediately from the mother to the fetus. While certain advantages are associated with the use of thiopental for cesarean section (pleasant, easy induction of anesthesia, control of eclamptic convulsions, or decreased incidence of postanesthetic vomiting), definite hazards are involved. These include respiratory depression of mother and, especially, of the infant and increased possibility of severe respiratory spasm if the mother has recently ingested food. While the drug is not contraindicated for use during cesarean section, it should be given only with full appreciation of the risks involved.

HYPERKERATOSIS

To the Editor:—*An 11-year-old boy developed a thick scaling cracking of the palms of the hands and soles of the feet four years ago. This resembles ichthyosis but is limited to the palms and soles. The condition has remissions and exacerbations which occur every three or four months. The soles of the feet have been relatively free from the scaling but appear dry. At the times of exacerbation of the condition the nails become brittle and break easily. The boy's general health has remained good. Many treatments have been tried with little success. In general, the most successful has been applying simple softening ointments to the skin and waiting from two to three weeks for the natural remission. Would this condition suggest a deficiency state? What tests and treatments might be beneficial?*

Dwight E. Conklin, M.D., Oakland, Iowa.

Answer.—Hyperkeratosis of the palms and soles (keratosis palmaris et plantaris) usually begins in childhood. Most cases are familial and in such patients no deficiency state has ever been demonstrated. Red, thickened, scaly palms and soles have been described as a manifestation of psoriasis and of pityriasis rubra pilaris. They may result also from mycotic infection, especially with Trichophyton rubrum. Numerous repeated examinations of the scales under potassium hydroxide and cultures must be done to exclude T. rubrum, particularly in view of the nail changes described in this case. In keratosis palmaris et plantaris bland lubricants and the avoidance of irritants provides comfort; a 1 or 2% solution of salicylic acid may be incorporated to promote peeling. No internal therapy (vitamin A, thyroid, or gelatin) has proved to be of value consistently. The prognosis should be guarded. Generally, patients retain the condition throughout life.

HAZARDS OF METALLIC PAINT

To the Editor:—*Is there a safe process by which a person can be covered with bronze or metallic paint?* *John H. Calvert, M.D., Pierce, Neb.*

Answer.—No form of this practice may be regarded as proper. At best, all such paints constitute a physiological insult to the skin. At present, real metal powders ordinarily have given way to plastic powders made to resemble metals or to fluo-

resce. Vehicles of the varnish type have disappeared, and corn syrup and glycerine are currently in favor. These agents do not dry the skin and may be readily washed from the body.

COMPOSITION OF COMEDONES

To the Editor:—*What is the composition of comedones? Has any work shown whether they are related to elevated blood cholesterol level, lipids, or androgens? Have there been any surveys of incidence of acne among different races and different dietary groups?*

G. H. Hoehn, M.D., San Gabriel, Calif.

Answer.—Some information, though fragmentary, regarding each of these questions is contained in a publication by Washburn and Liese (*J. Lab. & Clin. Med.* **41**:199, 1953). These authors also found that the cholesterol content of sebum was higher than normal in an adult with testicular insufficiency. The sebum cholesterol level was elevated to that usually found prior to puberty, and it dropped after testosterone therapy. Investigations of the composition of comedones are scanty, and further studies might be valuable. There are, however, several reliable reports on the composition of sebum in acne vulgaris. A concise review was published recently by Wheatley (*Practitioner* **180**: 580, 1958). Kile and co-workers (*Arch. Dermat. & Syph.* **61**:792, 1950) did not find any significant deviation of the sebum composition in skin areas affected by acne from that in unaffected areas of patients with acne or of normal persons. Dubovyi (*Vestnik Vener. Dermat.*, no. 2, p. 22, 1955), however, demonstrated a higher ketosteroid percentage in subjects with acne, and Wheatley's recent studies are highly suggestive of a lower concentration of unsaturated fatty acids. As pointed out by Rothman and Schaaf (*Handb. d. Haut-u. Geschlechtskr.* **1**:161, 1929) and again by Rothman in his textbook "Physiology and Biochemistry of the Skin" (Chicago, University of Chicago Press, 1954), ingestion of large amounts of cholesterol with the food can increase the cholesterol concentration in sebum.

TRACTION FOR WHIPLASH INJURIES

To the Editor:—*How useful is intermittent traction in the treatment of whiplash injuries or when pelvic traction is desired? Are the motorized traction apparatuses good for this purpose? If so, what types are best, and where may they be obtained?*

Delbert L. Warwick, M.D., Costa Mesa, Calif.

Answer.—The exact pathogenesis of whiplash injuries has not been determined. The acute episode probably is a sprain, with tearing of certain of the ligaments in the neck. There may be disturbances in the facet joints, as well as the lateral vertebral joints. Herniation of the nucleus pulposus also may occur as a result of whiplash injury. In none of these circumstances, with the possible exception of herniation, can benefit be expected from traction. Cervical traction probably has no justification in the treatment of so-called whiplash injuries. This applies during the acute period and for several weeks after the injury. Degenerative changes may result from whiplash injuries, with narrowing of the intervertebral disks, formation of hypertrophic spurs, and, sometimes, appearance of radicular symptoms and signs or both. During this phase cervical traction may be tried for its effect. If helpful, it may be continued. It is not clear whether the questioner means to use pelvic traction in treatment of whiplash injury. There seems to be no rationale for its use in this condition. It is used as part of the conservative management of lumbar disk affections. Motorized traction apparatuses are helpful in treating certain cervical syndromes, chiefly those due to degenerative disease, but the usual whiplash injury is not in this category.

FILLINGS AND LEUKOPLAKIA

To the Editor:—*Is there any evidence that mercury amalgam and gold fillings in the same mouth predispose to the formation of leukoplakia?*

M.D., West Virginia.

Answer.—There is no definitive evidence to support the concept that metallic fillings of varying electrical potentials predispose to oral leukoplakia. When an electrical force is produced under these circumstances it is on an intermittent basis and in a limited time ceases to repeat itself. Thus, if the electrical force can be considered trauma, it is not a chronic irritation. Patients may be aware of a salty taste which they attribute to the opposing metallic fillings, but this is often erroneous.

SCHMORL'S NODULES

To the Editor:—*A patient who died of multiple myeloma had showed Schmorl's nodules in an x-ray film about 11 years earlier. Should a patient presenting such nodules receive periodic bone surveys for several years?*

M.D., California.

Answer.—Schmorl's nodules, an acquired process, represent extrusion of a portion of the nucleus pulposus through the cartilaginous plate of the intervertebral disk into the body of the vertebra. They accompany the condition occurring in adolescents variously called juvenile kyphosis, Scheuermann's disease, or vertebral epiphysitis. They are also commonly found late in life and have no clinical significance except that their presence indicates some degeneration of the intervertebral disk. Pe-

riodic bone surveys are not indicated. The nodules have no relationship to and should not be confused with myeloma.

REJUVENATION

To the Editor:—*Is there any contraindication to the administration of gonadotropins to elderly men for possible rejuvenation or stimulation of their potency? Many advertisements recommend such treatment. How effective have these agents been for these purposes? What are the upper limits of safety for the continued use of these drugs?*

M.D., Missouri.

Answer.—There are no specific agents for the purpose of rejuvenation, but there are few, if any, contraindications to the administration of gonadotropins in small amounts, such as 0.167 mg. of estrone plus 1.67 mg. of methyltestosterone in a capsule given three times a day. However, the activity of prostatic malignancy is affected by the intensity of androgenic stimulation.

CLIMATE AND RHEUMATOID ARTHRITIS

To the Editor:—*A 17-year-old girl has had severe rheumatoid arthritis for about a year. At present she is much improved. She is now making plans for college. Would she be better in Denver than here in Minnesota?*

M.D., Minnesota.

Answer.—This consultant knows of no scientific evidence to indicate that climate is an important factor in rheumatoid arthritis. Some patients with rheumatoid arthritis feel better in a warm, dry climate, and some feel better in a relatively dry climate of higher altitude. In any climate, good treatment for the disease needs to be carried out in order to obtain the best results in controlling the disease. Since the patient has improved in her own environment, she would probably get along well in college either in Minnesota or Colorado, providing she continued to get good medical care.

ANTIBIOTIC COMBINATIONS

To the Editor:—*Is it ever practical to use both penicillin and a tetracycline simultaneously in the treatment of an ordinary and uncomplicated infection, such as otitis media or acute tonsillitis?*

M. A. Cornwall, M.D., Hudson, Wis.

Answer.—Combined antibiotic therapy may be used in patients with mixed infection to prevent the emergence of resistant bacterial mutants and for additive or synergistic effects against relatively resistant organisms. In ordinary uncomplicated otitis media or acute tonsillitis, it is needless, impractical, and illogical to use penicillin and a tetracycline simultaneously.

WOLFF-PARKINSON-WHITE SYNDROME

To the Editor:—*In the Wolff-Parkinson-White syndrome, during episodes of tachycardia, does the abnormal conduction pathway revert to normal, giving a QRS complex of normal measurements and form?*

Irving Berlin, M.D., Newport News, Va.

Answer.—During the episode of tachycardia, the QRS complex usually is of normal form and duration.

PROPHYLACTIC SURGERY IN CANCER

To the Editor:—*The answer to the question on prophylactic surgery in cancer, which appeared in* The Journal, *Jan. 10, 1959, page 183, needs some elaboration. The question is not whether an operation should be performed but whether it would be justifiable for three sisters, aged 38 to 42, to have prophylactic bilateral simple mastectomy when each of four older sisters has died from metastasis of breast cancer, within less than five years after radical mastectomy, at ages between 45 and 55 years. The answer to this seems to be an unequivocal "It would be justifiable." Whether it should be done is a matter of personal opinion and depends on such factors as general health, emotional make-up, and marital status.*

Although mastectomy is a traumatic experience for a woman, as the answer states, awareness of the fact that four sisters developed and died of cancer of the breast in the age period a woman is entering is probably at least as traumatic psychologically as the mastectomy and possibly more so. Since all four sisters died within five years, although the lesions had been found early, one can assume that they had unusually invasive malignancies and the same type would conceivably develop in the remaining sisters. This should be one more reason for a prophylactic operation. Where the psychological impact of mastectomy may be too damaging, it may be advisable to excise the glandular tissue of the breasts without removal of skin and nipple and to replace it by implantation of some foreign material.

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The above comment was referred to the consultant who answered the original question, and his reply follows.—Ed.

To the Editor:—*In the opinion of this consultant, prophylactic mastectomy under the stated circumstances is not justifiable. Furthermore, the foreign material generally used for the replacement of the normal gland structure is potentially carcinogenic, and such a practice should be mentioned only to be condemned.*

ELECTROSHOCK THERAPY

To the Editor:—*I would like to refer readers of* The Journal *to* Time *magazine, Jan. 26, 1959, page 23, and the article about "Plaintiff's Counsel," which tells the story of the "King of Torts," Melvin M. Belli, whose pet peeve is doctors and who presently is performing in Columbus, Ohio. In* The Journal *for Jan. 24, 1959, page 419, a question is asked about ventricular fibrillation as a complication of electroshock treatment. In answer to the question: "Does the rapidity of injection of succinylcholine have any bearing on the incidence of ventricular fibrillation?" the second consultant very properly adds that the management of circulatory arrest in the course of electroshock therapy depends, as in other such cardiac emergencies, on establishing as quickly as possible the type of abnormal mechanism, whether rapid ectopic impulse formation or cardiac standstill. Here the consultant goes out of his way to make a statement which I predict will warm the heart of Mr. Belli; he says, "Such a distinction is greatly aided by the monitoring of cardiac events on a cardioscope, which should be part of the routine equipment in any setup for shock therapy."*

How can a clinical psychiatrist, even in a hospital, afford to include cardioscopy as a routine measure for shock therapy? I would question whether 1% of the treatments in the United States are given with a cardioscope to monitor the cardiac events. Yet this statement would lead one to believe that without the cardioscope the physician has not taken reasonable precautions, and I would predict that this statement will be used to place in jeopardy the practice of well-qualified psychiatrists who have given thousands of patients electroshock treatment without even suspecting that a cardioscope should be "routine equipment."

I believe that statements appearing in the Questions and Answers section should be carefully read for possible medicolegal angles, particularly when the consultant is surrounded by the unlimited services of a large medical center and is not familiar with the conditions under which the average physician attempts to carry on the practice of medicine.

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The above comment was referred to a consultant, and his reply follows.—Ed.

To the Editor:—*Doctor Harding states that less than 1% of the shock therapy treatments given in the United States are given with a cardioscope to monitor the cardiac events. He is apparently concerned over the fact that, inasmuch as the cardioscope is not routinely used, the result may be to aid malpractice attorneys in planning cases against physicians where a cardioscope might have avoided a bad result from shock therapy. The fact that a consultant may recommend the use of a cardioscope would not establish negligence on the part of the physician who failed to use such equipment unless the plaintiff could establish that the use of such equipment was routine and standard. If less than 1% of the treatments in this country are given with a cardioscope to monitor the cardiac events, a plaintiff's lawyer would not be able to establish negligence because of the failure to use such equipment. This consultant does not believe that a medical consultant should be burdened with medicolegal implications where his recommendations involve matters relating to better medical care nor that there is any need to review routinely strictly medical matters for medicolegal implications. Although it is felt that physicians should be aware of their legal responsibilities in the practice of medicine, it seems that some practitioners have been oversold on the idea.*

RECURRENT INFECTIOUS MONONUCLEOSIS

To the Editor:—*In the questions and answers section of* The Journal, *Dec. 27, 1958, page 2332, no specific case is cited in reply to an inquiry as to whether infectious mononucleosis has been reported to occur a second time in the same patient. I should like to call attention to a report by Paterson and Pinniger* (Brit. M. J. 2:476, 1955) *describing three attacks of infectious mononucleosis in a young man at the ages of 14, 18, and 21 years. The diagnosis was supported by laboratory evidence in each instance. This is a most unusual occurrence. A review of reported cases of recurrence by these authors disclosed only one other case in which the diagnosis was confirmed by the Paul-Bunnell reaction.*

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The above comment was referred to the consultant who answered the original question, and his reply follows.—Ed.

To the Editor:—*The difficulties in studying the recurrence of infectious mononucleosis are well illustrated in the paper by Paterson and Pinniger cited in the comment, since, even in the thoroughly investigated case reported, they were unable to secure the hematological findings or the results of the Paul-Bunnell test when the first two attacks occurred. They satisfied themselves,*

however, that at least the second attack—suffered while the patient was serving in the Royal Air Force—was genuine, as shown by laboratory tests. When he was sick at the age of 14, "he had symptoms of infectious mononucleosis [and] the white blood picture was said to be suggestive of the disease and the Paul-Bunnell test to be positive." In the second case mentioned in the comment, presumably the one reported by Rugg-Gunn (Proc. Roy. Soc. Med. **47**:759, 1954), *the patient had the clinical findings of infectious mononucleosis at the age of 6 but hematological investigation was not done. Eight years later he again showed enlargement of the glands of the neck; blood examination was done, and the diagnosis of "glandular fever" was given. At the age of 20 he once more showed symptoms of the disease, and at that time both the differential counts and the Paul-Bunnell test confirmed the diagnosis. In the paper by Paterson and Pinniger, the findings of Bernstein in his review of the disease are cited. Of five cases of recurrence, in only one was the diagnosis confirmed during the second illness by the Paul-Bunnell test. Here the patient had initially an icteric type of illness, which was followed a year after recovery by an episode of glandular enlargement with fever. As the Paul-Bunnell test was not done on the first occasion, it seems that the possibility of this case being infectious hepatitis at that time cannot be entirely excluded. It appears, therefore, that the recurrence of infectious mononucleosis is rare, at least as judged by the cases reported in the medical literature.*

CELERY CONTACT DERMATITIS

To the Editor:—*In reading the answer to the question on celery contact dermatitis, which appeared in* The Journal, *Jan. 10, 1959, page 185, it occurred to me that there might be another explanation for this syndrome. This dermatitis, like that associated with parsnips* (Acta dermat.-venereol. **25**:179, 1944), *may be due to the presence of photodynamically active furocumarines in these plants. Members of the psoralen family are present in such substances as citrus oils and bergamot, the best known being methoxsalen or 8-methoxypsoralen, from Ammi majus L. Aside from the fact that workers at the University of Oregon School of Medicine have recently demonstrated significant amounts of psoralens in celery, the natural history of the dermatitis suggests contact with a photodynamic agent. The statement that "the harvesters were afflicted" would be true because these workers would also be exposed to ultraviolet energy. It is also stated that the eruption appeared "within 24 to 48 hours." A latent period of one to two days is usual after use of the psoralens. The eruption consisted of "erythema, edema, vesicles, and large bullae." This was presumed by the consultant to be on the hands, forearms, and perhaps the face and neck." These are precisely the areas either certainly or very likely to be exposed both to celery oil and to sunlight. Also, how better could one describe severe sunburn?*

In the light of these data, a rational, preventive approach may be recommended for trial. Psoralens augment the skin's response to ultraviolet energy and have no demonstrable topical activity in the absence of that energy. Field workers should be advised to avoid skin contact with the essential oil and direct solar exposure. Such measures as wearing sleeves rolled down and wearing gloves would help in two ways: contact with the plant would be minimized, and ultraviolet rays would be screened out. An extensive publication on psoralens and radiant energy (J. Invest. Dermat., *supp., Feb., 1959*) *should be consulted for further information on this fascinating subject.*

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NEURITIS OF RECURRENT LARYNGEAL NERVE

To the Editor:—*In response to a question and answer regarding neuritis of the recurrent laryngeal nerve, which appeared in* The Journal, *Dec. 27, 1958, page 2329, I noticed that the consultant failed to mention the possibility of laryngeal crises associated with tabes dorsalis (Fien and others,* Am. J. Syph. **36**:201, 1952). *The possibility of laryngeal crises associated with tabes dorsalis should be borne in mind in such a patient as that described in the question.*

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The above comment was referred to the consultant who answered the original question, and his reply follows.—Ed.

To the Editor:—*Although the correspondent is correct in pointing out the possibility of laryngeal crises in tabes dorsalis, this is a rare occurrence and reference to it is encountered much more frequently in earlier medical literature than in recent years, probably because of the decreased incidence of central nervous system syphilis. Laryngeal findings in tabes are usually preceded or accompanied by other signs and symptoms of the disease. It was assumed from the initial query that the various diagnostic studies on the patient in question had included a thorough physical examination and complete laboratory tests.*